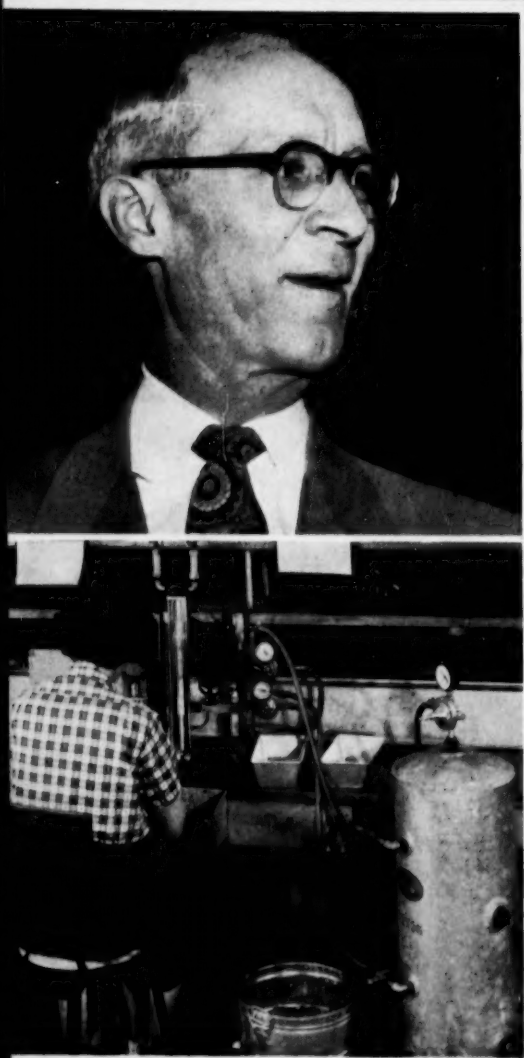


Chemical Week

February 19, 1955

Price 35 cents



Titanium's real future: shorn of superlatives, it's still mighty impressive p. 34

► **Union Leader Knight: a formidable bargainer, he previews this year's demands** p. 18

How do power prospects shape up? Here's a region-by-region rundown p. 56

Tough to find a real salesman? Managers accuse colleges of underselling the job p. 70

► **Many types, many materials— aerosol valves alone are now a \$8-million annual business .** p. 86

Do your present lacquer solvents
meet these Ketone advantages...?

1. **High purity . . . at no extra cost.**
You add the latent solvents
you prefer.
2. **Unsurpassed ease** of formula-
tion—for both nitrocellulose
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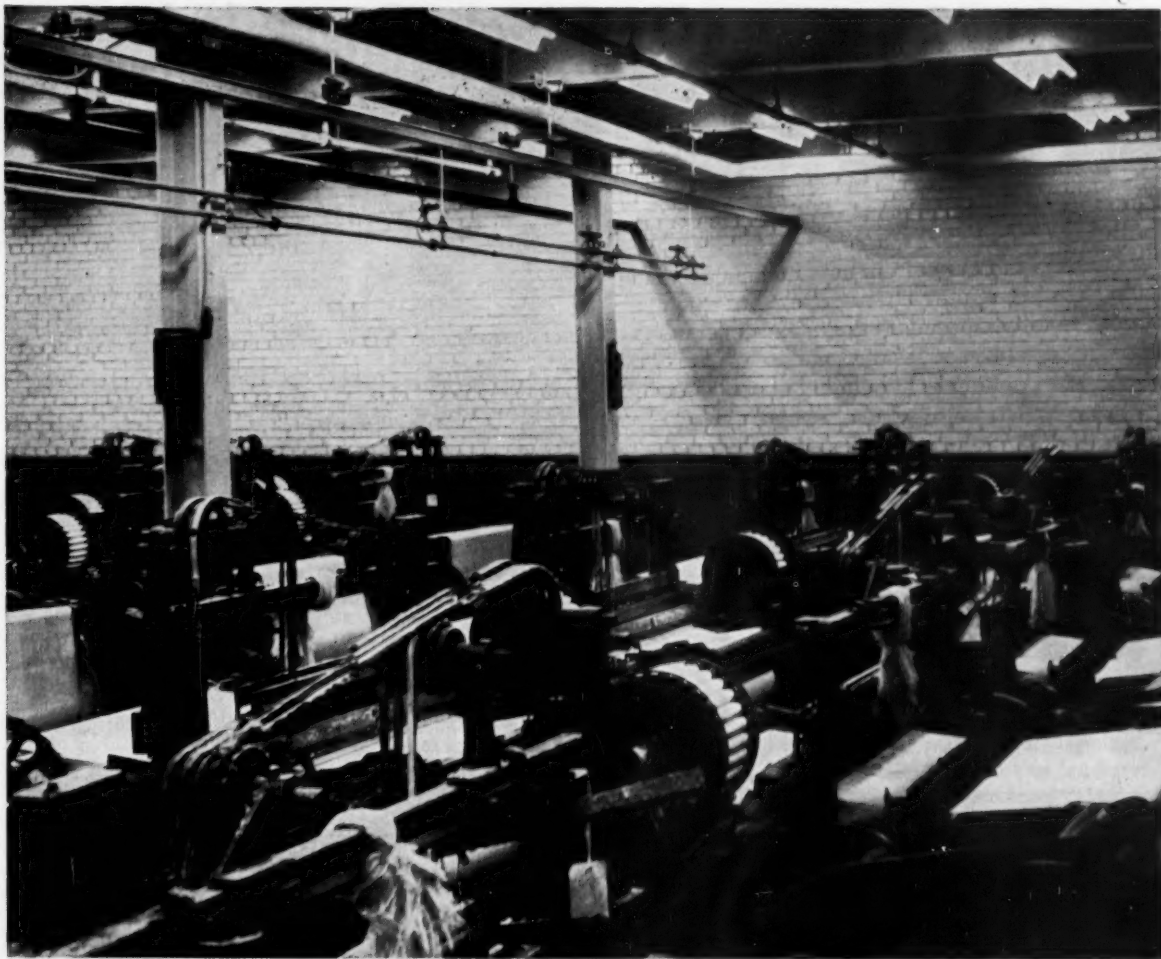
These five important advantages are yours when you use Shell Ketones. Lacquer solvent systems based on Ketones have so many inherent advantages they have become standard with the nation's foremost formulators of both nitrocellulose and vinyl lacquers.

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How to Put the Damper on Dampness

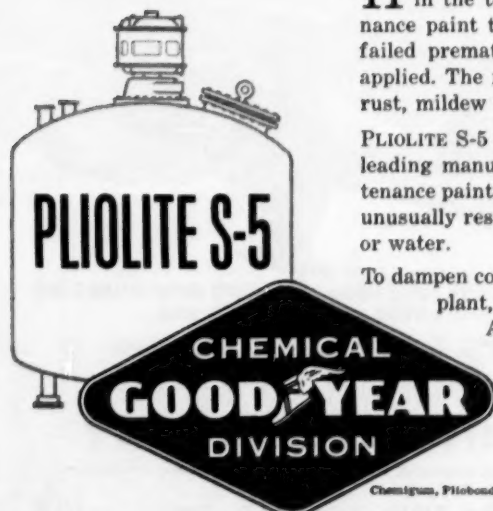
HIGH HUMIDITY raises havoc in many a plant. Such was the case in the textile weaving room pictured above. Every maintenance paint tried on the structural steel, ceiling and brick walls failed prematurely. Finally, paints based on **PLIOLITE S-5** were applied. The results were full satisfaction and protection against rust, mildew formation or saponification.

PLIOLITE S-5 is a high styrene-butadiene copolymer. It is used by leading manufacturers to make easy applying, fast drying maintenance paints. These high gloss finishes are easily maintained and unusually resistant to a wide range of acids, alkalies, oils, greases or water.

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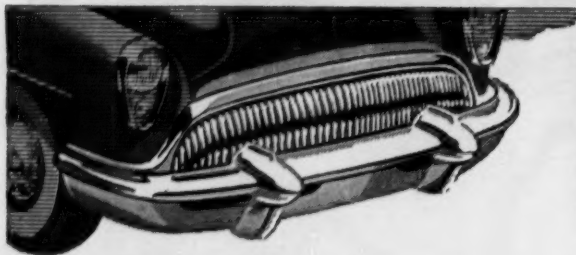
Goodyear, Chemical Division, Department B-9417,
Akron 16, Ohio.



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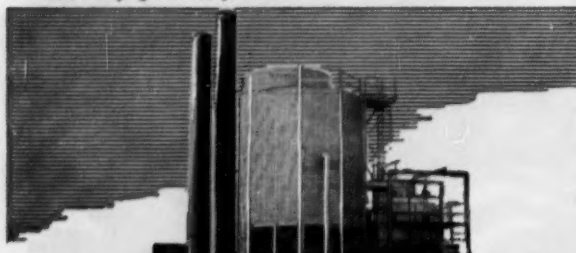
Mutual Chromium Chemicals Cover Industry



Automobile buyers demand Chromium plating for appearance and protection. Mutual supplies the plating industry with chromic acid assaying 99.75% plus.



Railroads find that Diesel locomotives with chromium plated cylinder liners extend the periods between overhauling jobs. Another application for Mutual Chromic Acid.



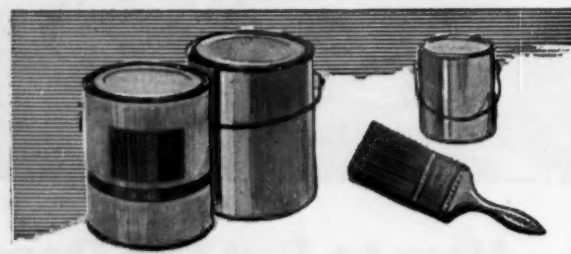
With water becoming scarcer, many industrial users recirculate water in cooling systems. Mutual Chromates effectively control corrosion of equipment.



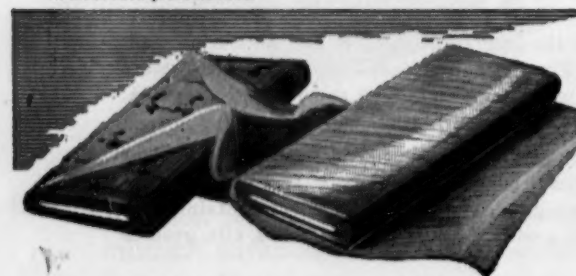
Tanners of superior leather products turn to Mutual for Sodium Bichromate and Koreon (one-bath chrome tan).



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Chemical Week

Volume 76

February 19, 1955

Number 8

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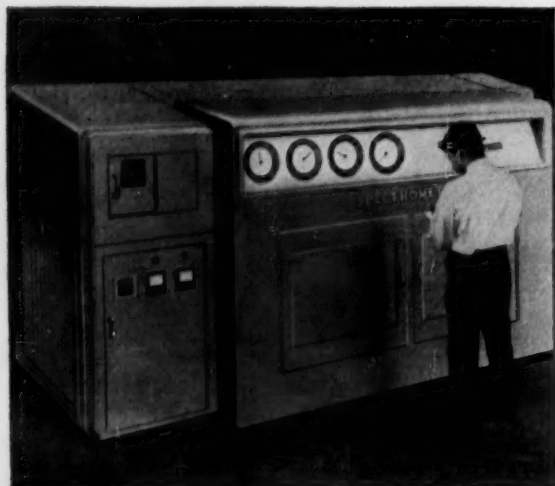
91 Thick vinyl coating, conventionally applied

91 U.S. Public Health Service introduces new insecticide, DDVP



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3-M 20" SPECTROGRAPH

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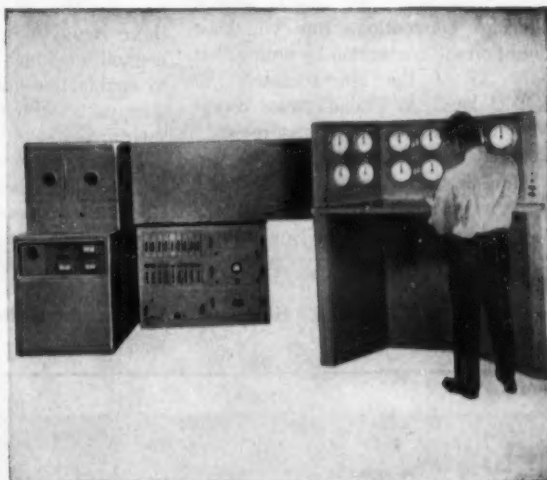
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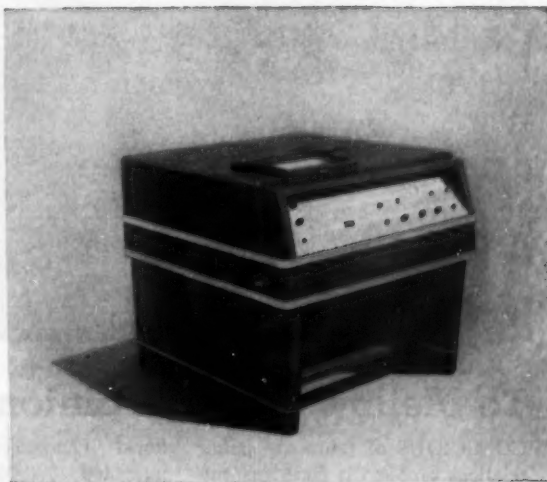
The instrument will accommodate as many as sixty photomultipliers providing many variations for complex work loads. Bulletin #34-C



INFRARED

The Double Beam I R Recording Spectrophotometer for 1955 retains in its new design the outstanding features which made operation, control and maintenance rewardingly simple and easy. In addition, its advanced engineering now provides important slit programming for greater reproducibility, a continuous variable speed drive, a two-speed recorder for expanded wavelengths scale, provision for recording wave or linear wavelengths and many other features for greater versatility with speed and accuracy.

Bulletin #33-C (to be shown at the Pittsburgh Analytical Exposition, March 1, 1955)



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Union Unanimity?

TO THE EDITOR: In your Jan. 1 issue you quote me as saying that the International Chemical Workers' Union's locals in Canada have put politics to one side and have accepted in a democratic spirit the results of the Chicago convention. But you cast doubt on my contention by noting that only 35 of the approximately 80 ICWU locals in Canada were represented at the recent district meeting in London, Ont.

Here is the attendance at the last three meetings:

1. Niagara Falls, Ont.—Nov. 1953—86 registered delegates, representing 28 local unions.
2. Quebec City—May 1954—100

delegates, representing 40 local unions.

3. London, Ont.—Nov. 1954—103 delegates, representing 36 local unions.

As you can see from the above, there is very little difference from the established pattern; your reference, although mathematically sound, is not sound when it is used to infer that there is anything political in it. Our council meetings are moved around to enable the smaller local unions to take part when the conference is in their area.

I would like to point out that in this period of change, the International Chemical Workers' Union in Canada has been successful in organizing some rather large units such as Canadian Pittsburgh Glass in Ville Lasalle, Quebec, where the unit is around 350,

Consumers Gas Company, Toronto, where the unit is over 200, as well as many smaller units.

It is also interesting to note that if the Gas-Coke (CIO) and Oil Workers (CIO) amalgamation is completed, the International Chemical Workers' Union in Canada will represent a much larger group than the new group combined. . .

GORDON MCILWAIN
Canadian Vice-President
International Chemical Workers'
Union
Toronto, Canada

In essence, labor leader McIlwain said that his Canadian locals are all pulling together and politics have been pushed aside. That's a rarity in any union; in the case of the Canadian group there may possibly now be such a unanimity of spirit but it hasn't been evidenced in the past four conventions. For instance, on the basic issue at last August's general ICWU convention 31 of the 68 Canadian locals voted one way; 37 the other.—Ed.



To Mellow Public Opinion

CONSCIOUS of the acute public relations problem it faces (as outlined in CW's Jan. 8 editorial), the pharmaceutical industry is now busy distributing a booklet to counter the criticism that prescription prices are too high. Some 860,000 copies of "I Hate to Buy Drugs but . . ." are being passed out by druggists and pharmaceutical houses.

Publisher of the booklet—Na-

tional Pharmaceutical Council—budgeted \$30,000 for the job (which was to cover the cost of considerably fewer copies) and originally allocated 5000 to each member company. Demand has far exceeded expectations so that the council now says enthusiastically: "We believe that the drug pricing story will soon be read by a major segment of the country's drug-buying public."

Archaic Verbs

TO THE EDITOR: Your headline "Success Begats Confidence" (Jan. 8, p. 15) . . . Present tense of "to beget" is "begets"; past tense, "begot"; archaic past tense is "begat" . . .

WILLIS G. WALDO
Consulting Engineer
West Palm Beach, Fla.

We fumbled typographically and begot a begat.—Ed.

DATES AHEAD...

Chemical Institute of Canada, protective coatings division conference, Royal York hotel, Toronto, Feb. 24; Ritz Carlton hotel, Montreal, Feb. 25.

Drug, Chemical and Allied Trades section of the N.Y. Board of Trade, annual dinner, Waldorf-Astoria hotel, New York, March 3.

Fourth Annual Water Symposium, Louisiana State University, Baton Rouge, March 22-23.

National Farm Chemurgic Council, annual chemurgic conference, Deshler-Hilton hotel, Columbus, O., March 22-24.

National Industrial Conference Board, marketing conference, Shamrock hotel, Houston, March 24.

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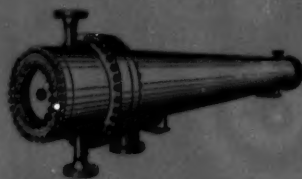


Chemical and Petrochemical Plants

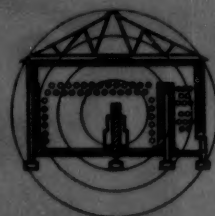


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NEWSLETTER

Synthetic diamonds were this week displayed for the first time, by General Electric at Schenectady, N. Y. This marks the first authenticated synthesis of the hardest existent substance, but for the time being it's little more than that. The present high production cost must be reduced before the synthetic crystals are competitive with relatively cheap industrial diamonds; and the size and quality of gem stones are still more difficult to achieve.

But it's more than a scientific coup. It may enable GE—eventually—to add synthetic diamonds to its Carboloy line of cutting materials.

The synthesis is accomplished by subjecting carbonaceous material to heat (5000 F) and high pressure (800,000 psi. or more).

•
The Defense Dept. has taken a firm step toward getting the government out of competition with private business. Its anticipated order (*CW*, Feb. 5, p. 15)—that would switch from the secretaries of the individual services to the Secretary of Defense the ultimate authority to decide whether to continue such operations—has now been signed.

Besides putting the final decisions in the hands of Charles Wilson—who is notably unsympathetic to the government's commercial activities—the order eliminates three of the eight criteria used to justify governmental operation. One of the culls: cost.

•
This will be a good year, says Business & Defense Services Administration's Chemical & Rubber Division. Highlights of its 1955 forecast:

- Total sales of chemicals and allied products will hit \$21 billion—up 4% from 1954.
- Production will be up a like 4%.
- Capital outlays will tally to \$1.2 billion—slightly below last year's.
- Competition will be “much keener.”

•
Miscellaneity marks last week's fast tax write-offs:

- National Aniline Division of Allied, \$2,118,150 at 45% for research and development facilities at Buffalo, N.Y.
- Ethyl Corp., \$160,000 at 90% for storage at Edgemoor, Del., of antiknock additives for aviation gasoline.
- Marblehead Lime (Chicago), \$134,160 at 50% for inland waterway dock facilities.

•
What's the U.S. capacity for penicillin? BDSA is skeptical of the figure it got from an industry survey—it's considerably above the 600-trillion-Oxford-units goal it set some time ago for achievement by last month. BDSA is resurveying to see whether firms included capacity now used for other purposes.

Once that's cleared, look for that long-promised meeting (*CW*, Oct. 9, '54, p. 95) on penicillin stockpiling—and possible discussion of whether precursor capacity is ample, particularly for lactose.

East, Midwest, South and Far West—the expansion parade continues:

- Just completed after two years' work is International Minerals & Chemical's \$2-million potash expansion at Niagara Falls, N. Y. Capacity was boosted for chlorine, caustic potash, potassium carbonate (*see Impact*, p. 24) and hydrochloric acid.
- Nearing completion at Louisville, Ky., is Girdler Co.'s \$1-million expansion of catalyst production facilities, reflecting the growth of petroleum processing and petrochemical manufacture.
- Stauffer Chemical has completed an insecticide and fungicide formulation plant at Lubbock, Tex.
- Du Pont has picked a Far West site—a 500-acre tract near Antioch, Calif., on the San Joaquin River—for a tetraethyl lead and Freon refrigerants plant.

•

It's growth like this that has drawn Arthur G. McKee & Co. (Cleveland)—designer and builder of petroleum refineries and steel plants—to the chemical and nonferrous metals fields. Its secretary-treasurer, H. R. Moorhouse, served notice last week to a group of security analysts that the firm "should cover" these new fields "to the same extent" that it serves the older ones.

•

The International Labor Organization's Chemical Industries Committee drew delegates from 21 nations to Geneva last week to study a report on the outlook for the chemical industries. Among the findings discussed by the government, employer and worker representatives:

- The industry's No. 1 job is to provide an adequate food supply for a world population growing at the rate of 40 million/year—and that means synthetic fertilizers. Europe consumes half of the current output and North America a third; this leaves only a sixth for the rest of the world. A corollary need is greater worldwide consumption of pesticides and other agricultural chemicals.
- Even though 40% of the world's people wear little or no clothing, there's still a vast—and constantly expanding—market for inexpensive synthetic fibers.

•

Concerned with many aspects of the industry's public relations, the Manufacturing Chemists' Assn. is mobilizing for the second "Chemical Progress Week" May 16-21. Like the first one (*CW*, May 15, '54, p. 44), it will be, as MCA puts it, a "grass-roots program with greatest emphasis on chemical industry plant communities."

One problem that MCA regards especially nettlesome: the dearth of high school science teachers, partly as a result of which fewer students are pursuing science courses, leading in a vicious cycle to a continued dearth of science teachers as well as an insufficiency of technical men for industry. One objective of the "Week" is, of course, to quicken the enthusiasm of young people for careers in science and technology.

•

Another problem—water pollution—occupied MCA's attention this week. Heartened by the success of its first regional workshop in Boston last fall (*CW*, Nov. 27, '54, p. 17), MCA sponsored a similar one this Wednesday in Albany, N. Y.

The Boston session was a "pilot" workshop—to determine the value of getting local plant men together with authorities to exchange views. Now it's planned to have several of them.

. . . The Editors



PRINTING ON TRANSPARENT PACKAGES, such as those of Saran and Mylar, must be as flexible as the package itself. Designs cannot lift off or crack.

FOR INK WITH FLEXIBILITY

The newer types of wrapping and packaging materials, such as Mylar, Saran, and Saran-coated cellophane, are becoming increasingly popular. Yet they are difficult materials on which to print. Inks commonly used on the older wrapping materials do not adhere well to these newer films, and frequently are not elastic enough to "give" with the stretching and folding of the plastic base.

However, recent Hercules laboratory work indicates that there should be no difficulty in the preparation of inks for

these newer type wrappings. For full measure of flexibility, and the requisite hardness and marproofness, Hercules Nitrocellulose is the preferred film-former. And, when properly plasticized with Abitol® (Hercules Hydroabietyl Alcohol) and Hercules Synthetics B21 Resin, excellent adhesion is secured.

Further details on these materials and their use in formulating inks with the necessary flexibility and adhesion can be obtained on request from any Hercules sales office.

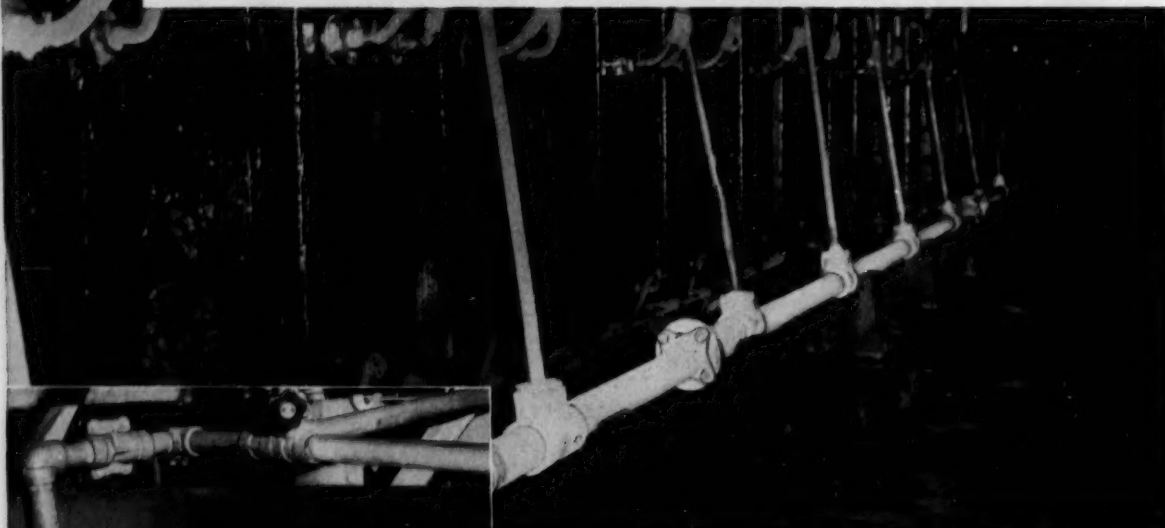
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View of cell room. The Uscolite piping feeds the brine into electrolytic cells, where it is broken down into caustic soda, chlorine and hydrogen.

Controlling highly corrosive brine was a major problem for a Providence, R. I., maker of chlorine products. The brine attacked the piping and replacements had to be made every 6 months. In addition, corrosive fumes shortened the life of another piping system in the plant.

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A product of United States Rubber Company, U. S. Uscolite Pipe has great impact strength. Yet it's very light in weight. It's available also in pipe fittings, valves, and sheet stock for fume ducts—will resist acids, salts, alkalies and gases, inside and out.

For replacement or completely new piping, get in touch with any of the 27 "U. S." District Sales Offices, or write address below.

Uscolite pipe and fittings are made in the broadest and largest line of stock sizes on the market. Sizes follow:

- Molded fittings in ½" through 4" I.P.S. ● Molded flanges ½" to 6" I.P.S. ● ½" to 3" Uscolite diaphragm valve (Hills-McCanna).
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WIDE WORLD

MERGER MAKERS MEANY, REUTHER: Their o.k. on AFL-CIO unity means . . .

Still Bigger Chemical Union

Unexpected prompt agreement between AFL and CIO Presidents George Meany and Walter Reuther on terms for merging their two organizations into one powerful federation leads to this outlook for labor unions in the chemical field:

Fairly soon—possibly during 1956—the expected unification early next month of the CIO's oil and chemical unions (*see p. 18*) will be followed by merger of that group and the International Chemical Workers Union (AFL).

This would confront U.S. and Canadian chemical companies for the first time with a single union large enough to dominate the chemical labor field, which now is divided among numerous unions. Membership in the combined AFL-CIO chemical union would be about 300,000 to start with, and it would have a mandate to conduct a vigorous organizing campaign. Still the lone wolf in the field, with no present intention of joining hands in the unity move, is the United Mine Workers' District 50, which claims to represent about 100,000 em-

ployees in chemical plants.

'Left-Out' Feeling: In the AFL-CIO consolidation plan approved late last week at Miami Beach, Fla., there's a clause that affiliated unions with overlapping jurisdictions "will be encouraged to eliminate conflicts and duplication through the process of merger."

All three union presidents concerned indicated to CW their belief that—as called for in that clause—a single strong chemical union should and will be formed; and ICWU's Edward Moffett estimated that this would take about a year, possibly more.

The press of events—including last week's clear indication that AFL-CIO unity is really coming and the almost certain merger next month of the two CIO rival unions—apparently has caused ICWU some anxiety about being left out in the cold. Moffett hinted that if the CIO oil and chemical unions would extend an invitation, he might send an observer to the special merger convention in Cleveland on March 1.

Both Elwood Swisher of the CIO

Chemical Workers and O. A. Knight of the CIO Oil Workers welcomed the new developments, foresaw more effective political action and fewer raids.

Swisher and Knight said that last year's "no raiding" pact would serve to keep peace with the AFL chemical union pending eventual unification. But Swisher let it be known that the CIO group will continue to feel free to try to take chemical membership away from District 50.

Later than You Think

Chemical companies that have put down atomic energy as something that won't be ripe for industrial use before 1970 may want to revise that verdict this week.

A concrete sign that the era of economic use of atomic energy may be closer now came last week when a large private power company told Congress that it plans to build near New York City an atomic furnace at a cost of more than \$30 million—all of which would be put up by the company itself. Construction probably will be completed within five years.

Consolidated Edison Co. of N.Y. said that in deciding on an atomic reactor for the 125,000-kw. power plant instead of a steam generator that would cost about \$20 million, management "had very much in mind the fact that the costs of conventional fuels in the New York area are relatively high." Con Ed says it will accept the prices that the Atomic Energy Commission says it will pay for radioactive by-products.

Another indication that the atomic age is here: Erroll DuBois, former machinist at Los Alamos Scientific Laboratory, has accepted an \$11,000 settlement of the \$200,000 damages suit he filed at Santa Fe, N.M., for injuries allegedly resulting from his working with radioactive materials. This suit likely will serve as precedent in future disability cases involving injury following exposure to radioactive materials in industrial plants.



ABT: Spokesman for German position on return of war assets.

WIDE WORLD

Signal of the End?

The question of whether or not to return the \$450 million of German assets seized by the government during the war to their former owners now looks headed for partial solution after two years of bitter controversy. Directly at stake is the fate of the \$100-million General Aniline & Film Corp. and indirectly, the fortunes of Schering Corp. (Bloomfield, N.J.).

Secret talks on the issue began last week between German and U.S. government experts. The German delegation was led by Herman Abt, shrewd financial diplomat who headed the German delegation to the London debt settlement talks; Walworth Barbour, Deputy Assistant Secretary of State for European Affairs, represented the U. S.

The U.S. reportedly confronted the Germans with a take-it-or-leave-it offer during the talks. After more than a year of behind-the-scenes skirmishing among State Dept., Justice Dept., and the White House, the Administration has reached a firm policy position on German assets. A draft bill has been approved at Cabinet level, which would do three things:

- Pay individual German claims in cash (or in kind) up to \$10,000 each.
- Return most of the thousands of patents and copyrights vested by the U.S. to their former owners.

- Require the sale of General Aniline & Film to American buyers.

This is the most important provision of the Administration's draft bill, from the point of view of the chemical industry. Sale of GAF has been blocked for years by litigation over whether it belonged at the time of U.S. seizure to I. G. Farben or to the Swiss holding company, I.G. Chemie. The Administration's proposal would cut such litigation, force immediate sale with the proceeds to be held in escrow pending final settlement of title dispute.

Neat Package: Individual German claims (up to \$10,000 each) are roughly calculated to total some \$50 million—and to comprise 90% of the total number of claims. These, under the new Administration formula, would be paid out of proceeds of remaining assets—hence would not require any Congressional appropriation.

The proposed return of German patents and copyrights isn't so simple, though. Nobody really knows the true value of many of the patents or how essential their retention by the U.S. may prove to be in terms of national defense.

Presumably the government will have to make a stab at culling out the vital patents, but there's sure to be argument on its decision.

There's a problem of equity to be threshed out, too. A number of patents have been licensed to U.S. companies on the assumption that they would not be returned to former German owners. The U.S. firms in many cases have invested substantial sums to develop these patents, would stand to take a loss if they were given back.

But Still a Compromise: With such conflicting interests, the Administration policy is at best a compromise that will satisfy no one.

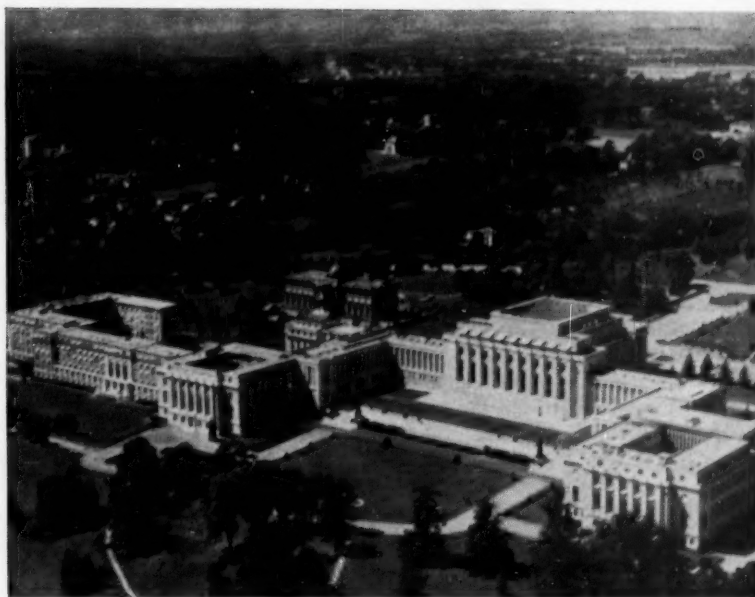
The Germans certainly won't be happy about it; they have held out for total restitution of their former assets on the grounds that seizure violated the sanctity of private property on which the capitalist system depends. They also argue that it doesn't make sense for the U.S. to spend billions to strengthen Germany as an ally and then weaken the German economy.

Opponents of any move to return vested assets, on the other hand, charge that the Germans really would be disappointed by the sale of GAF. They say one of the key German objectives has been to regain control of GAF all along. If it hadn't been, they could have negotiated a cash settlement from the U.S. at any time.

American owners of some former German properties are also unhappy over the Administration policy. They fear that the proposed bill would be an opening wedge for later Congressional action to return all vested assets. This would give their former German parent companies—which now are their competitors—fat windfall profits stemming from increased value of the assets.

Nevertheless, the Administration is almost certain to stick by its policy. It represents a hard-won compromise between Secretary of State Dulles and Attorney General Brownell—from which it would be hard to retreat without reopening the whole controversy. Moreover, the full Cabinet has approved the package decision on the understanding that it represents a final Administration position. Justice Dept. would balk at any further concessions to the Germans.

Thus, although the final details haven't been hammered out, it looks as though the end is near for the controversial war asset hassle. Nobody will get precisely what he wants, there may be much grinding of teeth, but the decision should get through Congress this year.



GENEVA'S PALAIS DES NATIONS: Where tariff delegates are seeking . . .

Clearer Track for Chemical Trade

Chemicals are in the picture from various angles this week as the Eisenhower Administration forces the pace in a race to get the President's whole complex foreign economic program enacted before Congress adjourns.

Foremost among the new developments—all of which would make for a clearer track for world trade in chemical products—is the meeting beginning next week in Geneva, Switzerland, where delegates from more than 20 nations will start negotiations on Japanese trade. There in the classical Palais des Nations building (formerly used by the old League of Nations), delegates will be racing against the June 12 deadline when the President's current tariff-cutting authority expires.

If they make the deadline, the Japanese will be eligible for further tariff cuts next year under the new trade agreements act. It will be a tight squeeze, but U.S. officials are confident that they can open world markets considerably to the Japanese. What's worrying the U.S. chemical industry is that opening European markets for Japan may be arranged at the cost of opening the U.S. market for European chemical producers.

Swift Action Sought: Other happenings that show the pressure building up behind the Administration's international trade program:

- Also in Geneva, negotiations to draft a new General Agreement on Tariffs and Trade (GATT) turned into the home stretch with most major hurdles passed. The new GATT agreement should be signed by the end of the month and fed into the Congressional mill as soon as H. R. 1 (*see below*) has cleared the House. The Administration considers its approval by Congress essential to continuing the reciprocal trade program. It will be the prime target of protectionists, who charge that it involves unconstitutional delegation of power to an international organization. The outcome is touch and go.

- In Washington, the House Ways & Means Committee finished hearings on the three-year trade agreements act (H.R. 1), went into executive session to approve (by 20-to-5 vote) the final draft of the bill and hammer out parliamentary strategy. The Administration is pushing for a vote in the House early in March, has greased the rails for fast action in the Senate.

- By the end of this month, the Treasury Dept. will send to Congress a new customs simplification bill whose import valuation clause looks to chemical management like an indirect challenge to the present U.S. selling price formula for evaluating certain chemical imports.

Part Way, or All?

Just how far will the U.S. go toward implementing recommendations made by the International Labor Organization? Chemical industrialists have been bothered by that question for a long time—in fact, since the U.S. joined the organization back in 1934. Now they know—from a report presented to the ILO's Chemical Industries Committee, now holding its fourth session in Geneva—that the U.S. will go along with the ILO at least to the extent of supplying information in copious quantity.

At its first session in Paris (1948), the committee adopted a resolution concerning holidays with pay in the chemical industries. Relatively unconcerned with the question, since most collective agreements in the U.S. adequately cover these benefits, the U.S. so far has taken no measures to implement this resolution.

Concerning a vocational training resolution adopted at its second session, the U.S. had plenty to say, though. Discussing worker training plans in the chemical industry, the government admitted that among the more than 200 unskilled and semi-skilled occupations, there's yet no single integrated training plan whereby young workers advance progressively to more responsible and better paying jobs. However, the government claimed, there's a growing awareness among both labor and management leaders of the importance of providing future industry needs for craftsmen and mechanics through some orderly system of apprenticeship. This, it says, should be established on a firm basis to insure both content and quality of apprentice training and not leave these to chance.

Also at this session, the U.S. was requested to take action on classification, labeling, and establishment of trademarks for dangerous chemicals. So far, delegates have not transmitted information on the subject—possibly because the U.S. doesn't have multilingual problems that foreign chemical makers face.

Then, at ILO's third session (Geneva, 1952), the U.S. was asked to consider general problems of hours in the chemical industries, with particular reference to comparison of day and shift work. In reply, the U.S. forwarded detailed analyses of hours

and premium pay provisions in 40 collective bargaining agreements for 1951. These covered about 78,000 workers in the industry, included details on hours of work, shift operations, overtime, weekend and other premium pay arrangements. In its analysis, the government found provisions for paid rest periods, wash-up and clean-up time were not then common, maintained that paid wash-up and clean-up time allowances were generally restricted to certain groups of workers.

So far, there's been no attempt to make U.S. chemical firms toe any lines drawn for conditions in other countries.

EXPANSION.

Ammonia: St. Paul Ammonia Products Co. (St. Paul, Minn.) plans a \$15-million ammonia plant 14 miles south of St. Paul. Capacity: 200 tons of ammonia and nitrates/day. Production has been scheduled to start in April '56.

Potash: The Potash Co. of America is progressing in its potash extraction and processing development at Floral, Sask., 14 miles east of Saskatoon. A \$3.5-million shaft is now being put down to potash beds 3400 ft. below the surface; the company also plans expansion of processing facilities.

Polyvinyl Alcohol: Du Pont plans to expand its polyvinyl alcohol units at Niagara Falls, N. Y., at a cost of \$3 million. According to present schedules, the new units should be ready early in 1956.

Pigmented Polyethylene: Acheson Dispersed Pigments, Inc.'s pigmented polyethylene plant at Orange, Tex., is due onstream next week. Polyethylene will be bought from Spencer Chemical, also in the process of commencing operations. Total plant cost: \$500,000.

Ammonia, Urea: Deere & Co.'s \$20-million ammonia-urea plant at Pryor, Okla., is now in operation. Fed by Oklahoma Natural Gas Co. pipeline (which has a capacity of 75 million cu. ft./day of gas) the plant is on a Missouri-Kansas Texas Railroad spur line. Capacity: 180 tons of ammonia, 275 tons of urea per day.

COMPANIES

B. F. Goodrich Rubber Co. of Canada, Ltd. has changed its name to B. F. Goodrich Canada, Ltd. Reason: "to keep pace with the company's accelerated activities in the chemical field."

Great Lakes Carbon Corp. has purchased a 20-acre tract of land four miles north of Ponca City for use in connection with its petroleum coke activities. The property, on U.S. 77 and the main line of the Santa Fe Railroad was bought from the Ponca City Chamber of Commerce.

Two more earnings reports:

- **Pittsburgh Coke & Chemical Co.** earned 71¢/common share in 1954—39¢ of it in the fourth quarter of the fiscal year. With improving business conditions in January, company officials are predicting equally profitable operations in 1955.

- **Spencer Chemical Co.** reports

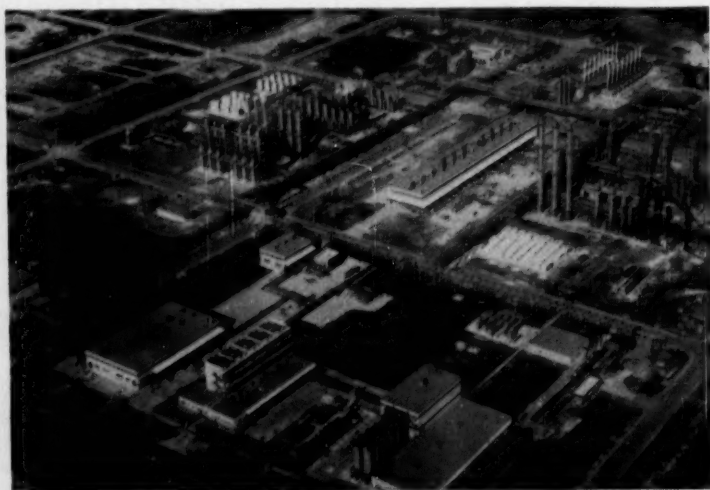
sales and net profits for the first six months of its fiscal year (ending Dec. 31) of \$14.2 million and \$1.5 million respectively—says the outlook for the balance of the year "looks good."

All the company's facilities (including the new Vicksburg, Miss., works) are operating at capacity; and heavy nonrecurring expenses (such as start-up costs at Vicksburg) have been covered.

The Equitable Life Assurance Society of the United States has acquired ownership of the 34-story Mathieson Bldg. in downtown Baltimore. Fidelity-Baltimore National has leased back the entire building for 65 years, and Olin Mathieson has simultaneously leased the space it currently occupies from the bank for the next 10 years. Purchase price: \$5.5 million.

Company incorporation in Delaware last week and authorized capital stock:

- **Colutex Oil and Uranium, Inc.,** \$300,000.

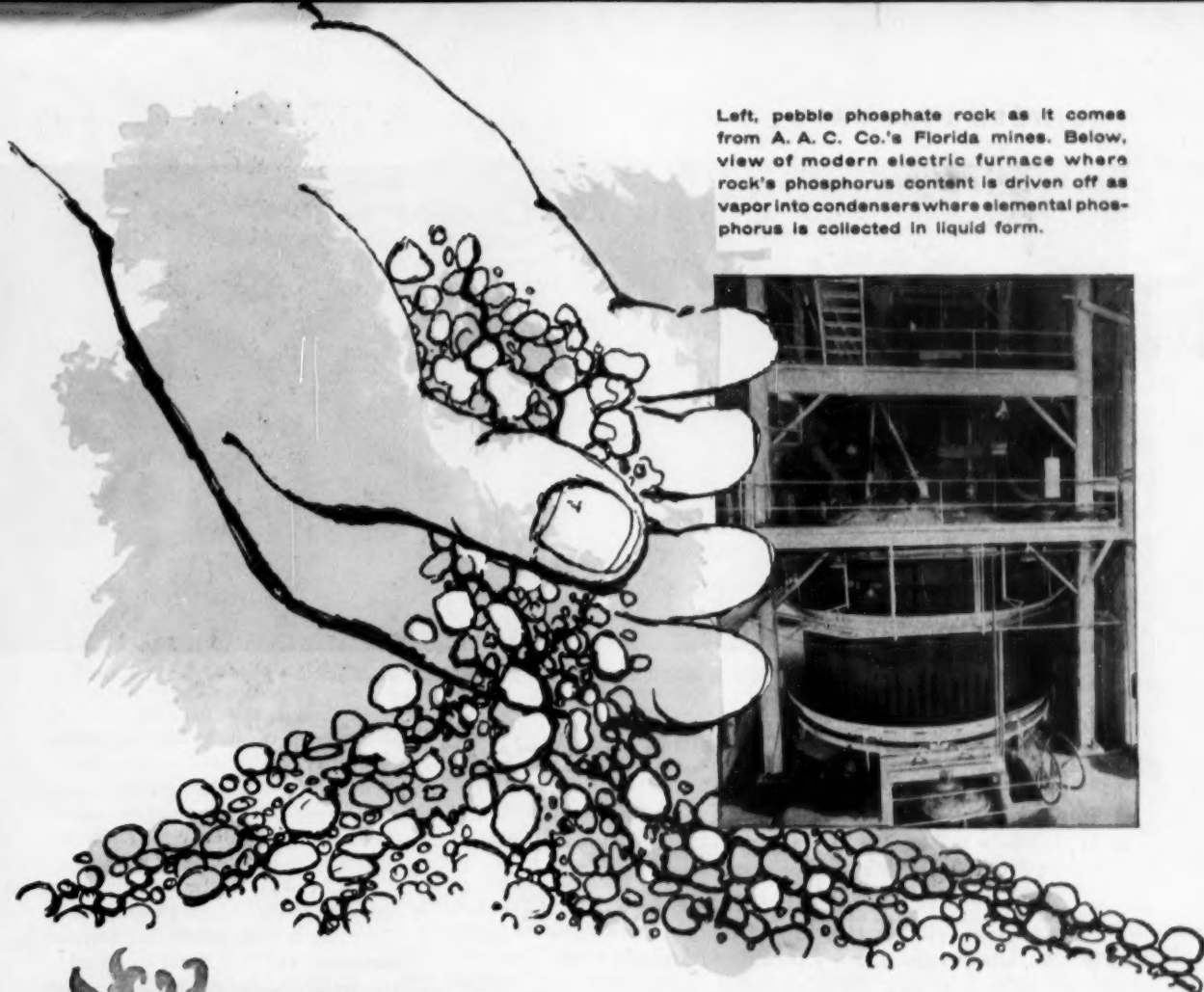


Three Down, One to Go

WHEN UNION CARBIDE's polyethylene plant at Seadrift, Tex., came onstream last week, the industry's capacity was increased by more than 25%. Seadrift's rating: 60 million lbs./year of polyethylene—more than the entire industry produced in 1950. As in the

case at other Carbide polyethylene facilities (South Charleston, W. Va., and Texas City, Tex.), the company also turns out ethylene oxide at Seadrift by direct oxidation. Also produced in quantity: butadiene. Coming up next: polyethylene units at Torrance, Calif.

Left, pebble phosphate rock as it comes from A. A. C. Co.'s Florida mines. Below, view of modern electric furnace where rock's phosphorus content is driven off as vapor into condensers where elemental phosphorus is collected in liquid form.



AA QUALITY Elemental Phosphorus

99.9% pure... Electro-Thermally produced



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Disodium Phosphate • Trisodium Phosphate
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All grades Florida Pebble Phosphate Rock
Superphosphate
Complete Fertilizers

OTHER AA QUALITY PRODUCTS

FLUORIDES AND FLUOSILICATES

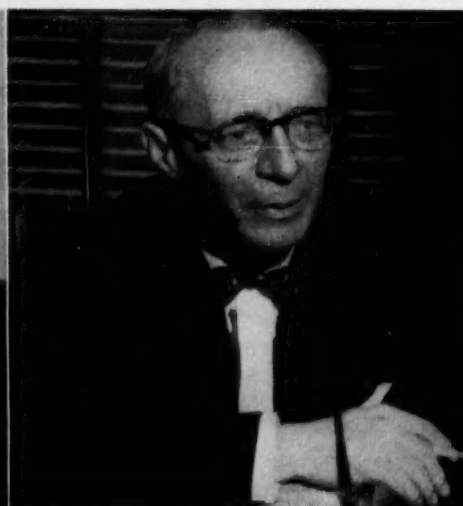
Sodium Fluoride • Ammonium Fluosilicate
Magnesium Fluosilicate
Potassium Fluosilicate
Sodium Fluosilicate • Zinc Fluosilicate
Fluosilicate Mixture
Ammonium Fluoborate
Aluminum Fluoride
Magnesium Fluoride

GELATIN

KEYSTONE® Gelatin: Edible, Photographic, Pharmaceutical, Technical

OTHER PRODUCTS

Animal Bone Charcoal
Bone Black Pigment (COSMIC® Blacks)
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Sulphuric Acid • Insecticides-Fungicides



CIO'S KNIGHT, with pal* and at Denver office, is mild-mannered ex-refinery stillman who's building a union that looms as a...

Future Force in Chemicals

Not another John L. Lewis, but still a formidable unionist to bargain with—that's Jack Knight, prospective president of big new Oil & Chemical Workers Union.

For chemical firms that'll soon be hearing from him, *CW's* interview brings a preview of Knight's views on bargaining tactics, mechanization, and guaranteed annual wage.

So far, very few chemical companies have encountered him directly; but as of this week, odds are that his influence will be felt within nearly every large chemical concern before 1955 is over. His name is O. A. (Jack) Knight, and he may wind up as labor union leader of the year.

As senior officer in the two CIO unions now bargaining at oil, chemical and petrochemical plants, and as principal architect in the move to build one strong industrial union for those fields, Knight appears to be leading candidate for presidency of the International Oil & Chemical Workers Union (CIO) that's expected to emerge from the joint session of the United Gas, Coke & Chemical Workers and Knight's Oil Workers International Union in Cleveland at the end of this month. The new union would be the largest and most militant in its jurisdiction.

In appearance and in manner, Knight is the very antithesis of the leonine John L. Lewis, whom the general public tends to regard as the

* CIO President Walter Reuther.

classic example of a labor union executive. While Lewis is hulking and imperious, Knight is slight, slender, relatively soft-spoken. Knight is the kind of man whom everyone calls "Jack"; few indeed are the people who address Lewis more familiarly than as "Mr. Lewis."

Persevering Plugger: But this doesn't mean that Knight is any less of a scrapper than the more bombastic Lewis. With patient, persistent plugging, he has built up a vigorous union among the ruggedly individualistic oil workers, and has become a principal figure in the country's year-to-year wage struggles.

In discussing the outlook for the new and expanded union, Knight foresees no "sudden or drastic" changes in collective bargaining practices in the chemical industry. There'll be these differences, however:

- More chemical plants will be unionized. ("We will attempt in every legitimate way that we can think of to organize every worker in the oil and chemical industries . . . the organizing activities of the new union will exceed

the present efforts of the two unions combined.")

- More chemical bargaining groups will be consolidated under one union, "thus increasing the opportunity for coordinated bargaining efforts."

- Chemical local unions will be backed by a larger parent union, "stronger in both human and financial resources, and thus better equipped to render day-to-day services and to meet emergencies."

No Industrywide Pacts: Up to now, Knight says, there have been no plans to revise bargaining techniques at chemical plants, and no specific proposals as to companywide bargaining with any particular firm.

"We always favor companywide bargaining on those items that are de-



NO LIVE BAIT: Between trout stream trips, Knight scours fly-casting gear.

terminated, from management side, at top company level, such as pension plans, savings plans, and other items that of necessity must be uniformly applied companywide," he added.

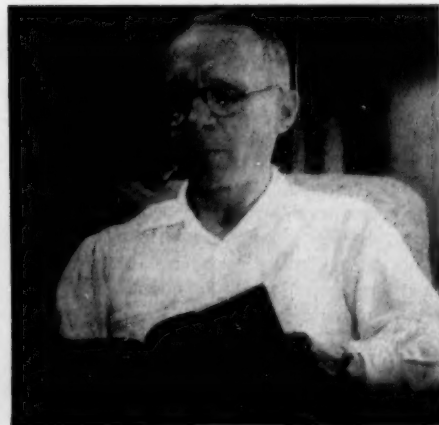
Industrywide bargaining is out, although that's the policy Knight has been advocating in the petroleum industry. He feels that the major oil companies should bargain jointly on wages and hours, much as has been the practice in coal and steel.

Reciprocal Citations: But there's sure to be some interaction between the bargaining campaigns of the oil and chemical wings of the new alliance. Knight says it's "reasonable to presume that chemical negotiating committees will cite oil contracts in asking for improvements in those cases where oil contracts contain better provisions under similar conditions."

To chemical companies that will bargain with the new union, the significance of that "presumed" use of oil contracts as points of reference in chemical bargaining can be gauged by this latest comparison of average weekly earnings in the two industries:

Chemicals and allied products	\$79.71
Petroleum refining ..	96.87

Knight's in favor of more mechanization at chemical plants, provided that workers' buying power is increased "so that a market can prevail for the outpouring of automated plants." He thinks that relatively stable employment makes the guaranteed annual wage question "rather academic" in the chemical industry.



AVID READER: At Denver home and while traveling, a nonstop reader.



SEN. MARTIN: For water pollution control, states still mainly responsible.

One Quick Trigger

Formosa, atomic energy, and armed forces' strength aren't getting all the attention in Washington this week; both Congress and the Administration are laying plans for more concerted attacks on air and water pollution during the coming fiscal year.

On Capitol Hill, bills have been introduced to extend present laws on pollution and to expand the federal government's role in pollution control. Within the executive branch, the Dept. of Health, Education & Welfare has started a stepped-up pollution control program.

Both moves are in accord with President Eisenhower's recent proposals on public health. However, it appears that some members of Congress want to go even further than the White House program in combating pollution.

More Federal Authority: In two respects, the Administration-backed bill (S. 890) introduced by Sen. Edward Martin (R., Pa.) would vest a little more authority in the federal government. In making permanent the Water Pollution Control Act that's now due to expire June 30, '56, Martin's bill still recognizes the individual states' primary responsibility for pollution control; but it increases federal power in these respects:

- The Surgeon General of the U.S. Public Health Service would be authorized to establish standards of water quality for a river at the point

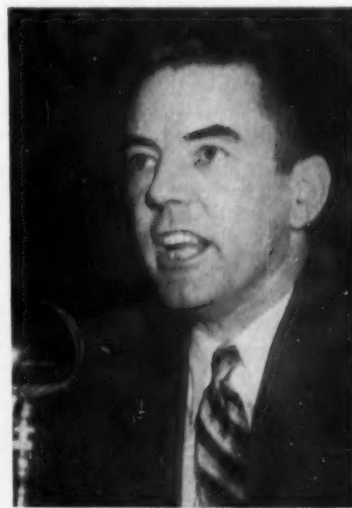
where it flows across a state boundary. However, this would be done only if the states concerned failed to come up with acceptable standards.

- The Surgeon General would be able to move more promptly in filing an abatement suit in the federal courts. PHS feels that being armed with a quicker trigger for such litigation might help to bring about compliance more rapidly after a company has been notified that an unsatisfactory pollution condition exists.

Speedy Write-offs: Over in the House, Rep. John Byrnes (R., Wis.) and 12 other congressmen of both parties are boosting bills that would permit five-year depreciation for tax purposes on equipment for abatement of air or water pollution. These are the first bills of this kind to lump both kinds of pollution. Up to now, fast write-offs for pollution control facilities have been opposed by the Treasury because of the potential revenue loss.

H-E-W Secretary Oveta Culp Hobby has appointed Arthur Stern as director of air pollution studies at the PHS Sanitary Engineering Center in Cincinnati. She also announced that much of the agency's air pollution control research will be concentrated in the Los Angeles area, where the smog problem is particularly pressing.

All this still isn't enough, according to California Senators William Knowland and Thomas Kuchel. They're plugging for additional research funds as well as tax concessions for firms that buy control equipment.



REP. BYRNES: In lumping air and water pollution control, his bill is first.

Still Snowballing

Quietly—without fanfare—the chemical merger parade is continuing. Within the past week plans for merger of Warner Hudnut, Inc. and Lambert Co. have been approved by company directors; American Monomer Corp. and Monomer-Polymer, Inc. were acquired by the Borden Co.'s Chemical Division. Both moves were made with diversification in mind—Borden in the direction of thermoplastics and polyvinyl alcohols, Hudnut and Lambert with "a more balanced operation" a foremost consideration. General outlook: several score more such amalgamations by spring.

Despite solemn rumblings from Washington, the spate of chemical mergers and acquisitions is continuing.

Chief reason: the need for product diversification—now an economic necessity to large sectors of the chemical process industries.

There is a rapidly growing belief among chemical executives today that economic strength lies in diversity of products. Much like the sort of reasoning that lies behind the investment trust, industry leaders are turning toward a variety of products as the simplest and most expeditious means to insure business stability.

That's the basic reason behind most of the recent mergers and acquisitions. Company representatives are frank to admit that their thinking lately has been spurred by a host of glaringly obvious examples—cases in which a company has pulled through a temporary market lull or a momentary period of overproduction on the strength of its diversification.

Rising costs and heavy depreciation charges have added to the necessity of diversification for the medium-small company. With more products, in a gamut of fields, a firm stands less chance of seeing earnings dissipated by the disappearance of a single market.

Such—to a greater or lesser extent—was the case in these recent unions:

Witco-Emulsol

When Witco Chemical Co. (New York) acquired the Chemical Division of The Emulsol Corp. (Chicago), it was strictly a move in the direction of diversification. Emulsol, with a 30-year record of producing surface-active agents for use in the food, pharmaceutical, cosmetic, paper, rubber, textile, and synthetic detergent industries, was casting about for a deal that would protect the privately

owned company in a competitive squeeze and assure it of continued management with greater security. Witco, also privately owned, was looking for immediate expansion of current facilities "of a nature that would dovetail and augment both domestic and foreign activities."

The new setup, management of both companies hasten to state, won't change production or personnel in any way. But both companies stand to profit from the availability of the other's facilities.

Pennsalt-Index

Pennsalt's purchase of a major interest in Index Chemical Co. (Houston) follows an even more specific pattern of diversification. Index, a five-year-old company, was the first U.S. firm to produce ethyl and methyl mercaptans synthetically for commercial sale. Pennsalt, through its Sharples Chemicals Division, has been turning out a related line of synthetic organic sulfur compounds—wanted mercaptans such as Index was turning out to round out its product line.

Further: Sharples has been a major Index customer since the company was founded; the two companies had worked together on a number of projects (e.g., systemic insecticides).

Also a strong selling point from Pennsalt's point of view: Index has a process of making such organic sulfides as dimethyl sulfide, methyl ethyl sulfide, at a "reasonably low cost," has a good market to sell its methyl mercaptan (for use in making methionine) in Du Pont's Beaumont, Tex., plant—

which consumes some 5 million lbs./year.

From Index's view: purchase by Pennsalt gives it a ready-made market development and sales organization; the greater range of expansion potential gives it hope of more effective (and immediate) inroads on the chemical intermediates.

From both companies' angle: combined gas odorant production will provide stronger competition for Oronite—chief rival for U.S. markets.

Harshaw-Zinsser

Harshaw's offer to the stockholders of Zinsser Chemical Co. (Hastings-on-Hudson, N.Y.) to trade Harshaw common for all the outstanding stock of Zinsser, was similarly based on a need for diversification.

Zinsser, founded in 1897, has done extensive work (on a small scale) in producing lakes, toners, dyes, and tannin for the printing ink, textile, pharmaceutical and paper-producing industries. Sales have been relatively modest (under \$5 million last year), but the company was well-known for its developmental work in certain specialized chemicals—e.g., quinizarine-type anthraquinone dyestuffs.

Harshaw admittedly lacked experience in organic chemical production—although its plants turn out a wide range of inorganic products. Total corporate sales: over \$53.6 million last year; main item: electroplating materials.

Moreover, the scope of Zinsser's research didn't begin to match that of competitors. Now Harshaw facilities will be opened up to Zinsser; a number of possible product potentials can be explored.

Making the purchase even more natural: both companies sell to the same industries; there's a great possibility for saving in sales setups that can easily be combined.

From Zinsser's standpoint, the offer's growth aspects also look good. Privately owned, with only a handful of stockholders, the merger will put its stock on an over-the-counter basis, make funds more readily available for new plant capacity.

Harshaw's bread-and-butter production will (at least for the moment) continue to be electroplating compounds. But its purchase of Zinsser will make earnings far less dependent on the availability of nickel.

Louisville Method

Louisville Dryer "Family" boosts production, cuts costs for chemical manufacturer

Dryer Types Installed
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10 ft. x 100 ft. size
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Pilot Dryer
38 in. x 25 ft. size

Some years ago a large chemical company bought the smallest commercial Louisville Steam Tube Dryer as a pilot plant for a new product. Today this firm owns a whole "family" of Louisville Dryers, ranging from their original small pilot plant to the largest steam tube dryers ever built, Louisville's 10 ft. x 100 ft. rotary dryers.

Large or small, there's a *right* size dryer for your job. Louisville relieves you of guesswork about dryer size, type or construction. Our engineers survey your problem . . . their recommendations are job-tested in our pilot plant. Your Louisville Dryer is *built*—not assembled—and built right for your job. Its performance is backed by over 50 years of successful drying experience.

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LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

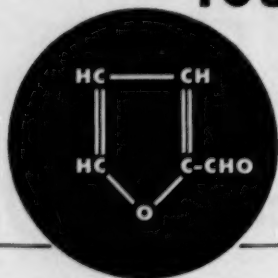
Dryer Sales Offices: 139 So. Fourth Street, Louisville 2, Kentucky • 380 Madison Ave., New York 17, New York

General Offices: 135 So. LaSalle Street, Chicago 90, Illinois

In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario

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DESCRIPTION

An amber-colored, mobile liquid with an odor like oil of bitter almonds.

PROPERTIES

Specific Gravity, (20/20°C.)	1.161
Boiling Point, °C. (Todd Still), 744 mm.	160 (98%)
Freezing Point, °C.	-36.5
Flash Point, (open cup), °F.	150-160
Refractive Index, (n 20°/D)	1.526
Surface Tension at 20°C. (dynes/cm)	49.
Viscosity (Centipoises)	
38°C.	1.35
54°C.	1.09

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Write for Bulletin 204. A few words as to the nature of your interest will enable us to select for you other pertinent literature about

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BUSINESS & INDUSTRY



Cooperation Personified

AT A 50-ACRE SITE, on Clear Creek, Tex., members of SERA (Shell Employees Recreation Assn.) are hard at work this week building barbecue pits and picnic tables for use this spring.

Boasting a membership of 2500 (more than half of all workers at Shell's Deer Park, Tex., plant), the association voted to purchase the land last year; has extravagant plans to remodel a club building for dances and other activities by summer; will work on a swimming pool when funds become available.

Membership dues are \$5/year;

Shell matches the amount the club gathers in through subscriptions, permits installation of "Coke" vending machines in its plants to increase club revenues.

Initial suggestion for the employee-employer recreational site, company officials are quick to point out, came from Shell workers themselves. Proof of the enthusiasm with which they've rallied behind the plan: a flood of volunteer labor "to get things shipshape before warm weather sets in." Many workers are turning Saturday building stints into family outings.





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Celanese source gives manufacturers the dependable, continuous supply and price stability they are looking for.

The Celanese technical service department is set up to give detailed assistance in the development of paints with polyvinyl acetate emulsions. Use the coupon below to receive the New Product Bulletin on PVAc emulsions for paints or write to

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PLASTICS and RESINS

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BUSINESS & INDUSTRY

Now It's Official

Britain has decided to go ahead with the ambitious smog reduction program proposed last month (CW, Feb. 5, p. 20). Following talks with British industrialists, Minister of Housing Duncan Sandys has suggested:

- Prohibition by law of the emission of dark smoke from any source.
- Legal requirement to the effect that all new industrial plants built henceforth be equipped "so as to preclude release of smoke, dirt and grit into the atmosphere."
- Empowerment of local authorities to institute smokeless zones as a means of progressively controlling smoke emission.

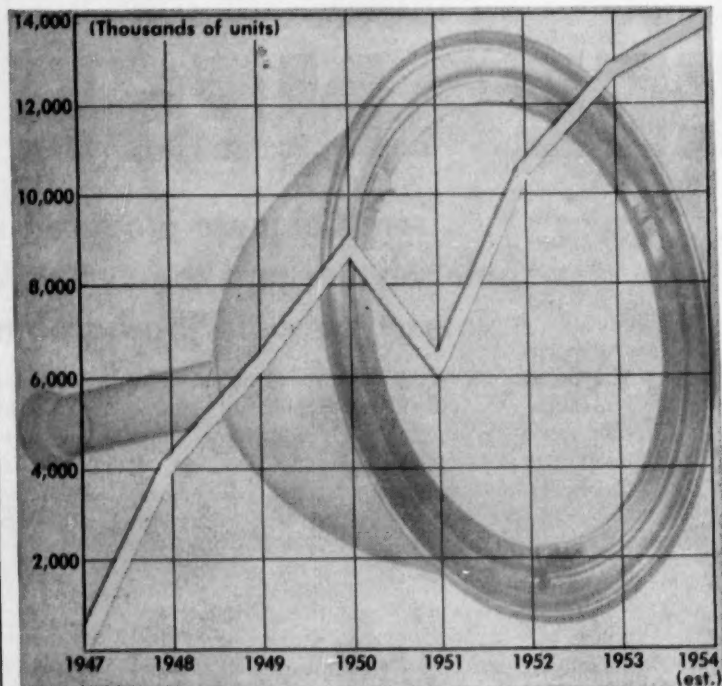
• Enforcement and inspection by both local and national officials.

• Prohibition of household heaters "of any type that burns other than smokeless fuel"; cost of conversion to be subsidized by the government.

One question, government spokesmen admit, remains to be settled: the future availability of smokeless fuels in Great Britain. But chemical producers think that's simply a problem of reallocating already-available materials.

The program as drafted, they predict, will be passed, since antipollution is an accepted necessity in Great Britain today. Chemical plants, in the future, will be built with pollution abatement as a top consideration.

IMPACT



Bright Spot for Chemicals

CHEMICAL SUPPLIERS could well be viewing TV with two-fold interest—not only for entertainment, but also for the profit potential that industry offers. Last year cathode ray tubes for TV consumed something like 180 tons of "phosphors"—phosphorescent zinc

cadmium sulfides. A 21-in. screen requires about 8½ gm.—32¢ worth. In addition, the industry consumed last year: over 168,500 tons of "soft" glass (including large quantities of potassium carbonate) and an estimated 658 tons of plastics (mostly phenolic) for tube bases.

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magnesium oxide

99.5+
MgO

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New facilities have been completed to produce *Magnesium Oxide* synthetically by direct decomposition of magnesium chloride under controlled reaction. For the first time, because of this new process, it is now possible to offer industry this basic chemical in large tonnages in the purest form ever made in commercial quantities. The stable source of magnesium chloride, as a raw material, will permit continuing large volume production of uniformly high quality *Magnesium Oxide* that is essentially free of calcium, silica, iron and alkaline impurities.

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BUSINESS & INDUSTRY



HOECHST UNITS ON THE MAIN RIVER: Employ 16,000 workers.

FOREIGN.

Expansion/West Germany: On March 1, directors of Farbwerke Hoechst AG, (Frankfurt) will propose to increase the company's capitalization from 99.3 million to 385 million DM. Object: to supply funds for an investment program designed to extend over "the next several years."

Output from current production facilities increased Hoechst's sales volume 20% in 1954 (over 1953); the company today accounts for about 10% of total West German chemical production. But the expansion boom is far from over. Plans for extending synthetic fiber production this year are already under way; directors expect to place heavy emphasis an antibiotic and other pharmaceutical-producing units soon.

Vinyl Acetate/Great Britain: The Chemicals Division of the British Oxygen Co. (Chester-le-Street, England) has just brought its new vinyl acetate monomer facilities onstream. Built at a cost of \$1.4 million, the plant will use captive acetylene from BOC, one of Britain's largest producers. Capacity is not revealed.

Plastics/Mexico: Monsanto Chemical Co. will expand its Mexican plastics operations, also plans to enter chemical production there this year. Reason: Monsanto officials are bullish about the Mexican market despite readjustments precipitated by Mexico's 40% devaluation of the peso last April.

The company's Mexican affiliate,

Monsanto Mexicana, started production of synthetic resins and molding compounds in 1951 with an initial investment of 3.5 million pesos (\$437,000); today, capital investment is reportedly 12 million pesos (\$1.5 million), sales are running over \$1 million/year.

Details of the proposed Monsanto chemical plant have not been revealed, but, like the company's resin production, it's expected that output will be consigned strictly for domestic consumption by Mexican industries.

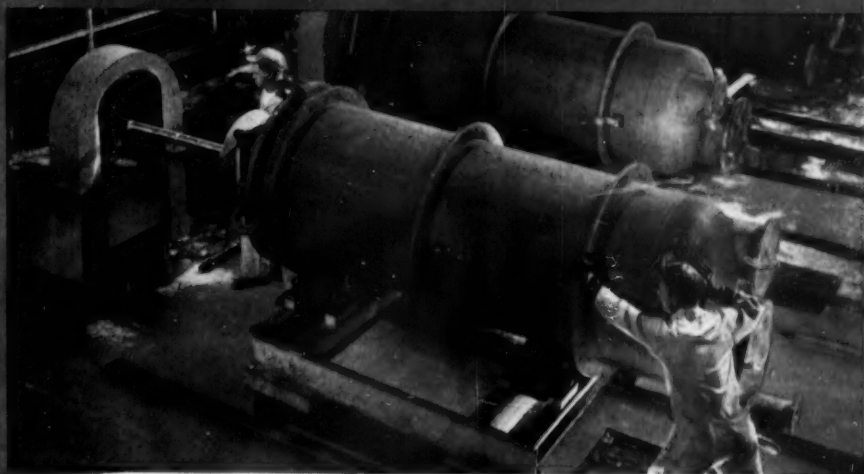
Tungsten/Korea: The South Korean government-controlled Taihan Tungsten Corp. offered 250 tons of tungsten ore for sale last week at its second international auction. Bids were received simultaneously at Seoul, New York and London; high bidder: Huachang, a Nationalist Chinese firm in New York.

Sulfur/Iraq: Iraq Economics Minister Nadim Pachachi, told the Iraq Chamber of Deputies' financial committee last week that negotiations with Texas Gulf Sulphur Co. (New York) over a concession to exploit northern Iraq sulfur deposits have officially been terminated. Reason: "terms submitted by the U.S. company are insecure to Iraq's full rights. . . ."

Further, Pachachi says that in order to secure full information regarding Iraq's sulfur deposits, the government will engage the services of a "foreign expert of high standing" to report on the possibility of "exploiting its own sulfur resources."

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4. **Resistance to abrasion**—Hardness averages 48 Rockwell C and can be increased to 66 Rockwell C through post-plate heat treating.

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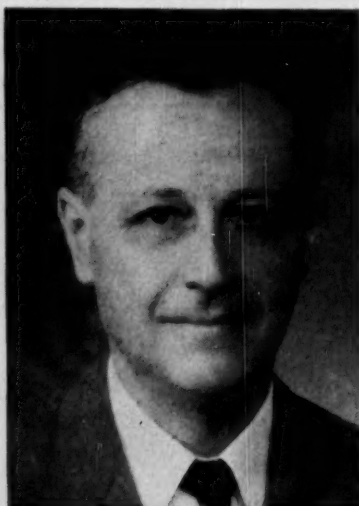
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BUSINESS & INDUSTRY



CON ED'S DR. FRANCO: For potential "problem worker," detection and cure.

LABOR

Alcoholics in the Plant: Steps that can be taken to cure the alcoholic employee, and to detect and correct the man who may be on the road to alcoholism, were outlined by Dr. S. Charles Franco, associate medical director for Consolidated Edison Co. of New York, at the American Management Assn.'s winter personnel conference held early this week in Chicago's Palmer House. Other topics at the three-day meeting—which featured the televising of labor contract negotiations between a Connecticut manufacturer of plastic and fibrous materials and an AFL union—included pre-employment testing, guaranteed annual wage, supervisory training program, and a talk on "Negotiating a Competitive Company-Union Contract" by General Aniline & Film's Vice-President Matthew Cougher.

Wages to the Fore: As so often is the case, labor union people seem to be talking mostly about money this week. Examples:

- Out in Akron, O., officials of the International Chemical Workers Union (AFL) are planning a drive to break the current pattern of 5¢/hour wage increases that has prevailed in the chemical process industries for the past year. Their aim: a 7¢ pattern for the rest of 1955.

- Also in Akron, negotiators for the United Rubber Workers (CIO) have started bargaining for new contracts with General Tire & Rubber and

Seiberling Rubber. A new pact is being put together in Cincinnati for employees of Goodyear, and negotiations with U.S. Rubber will begin soon.

- At Miami Beach, Fla., AFL staff economists have unveiled a forecast that unions will gain "substantial" wage increases this year, even though they expect that there'll be many more people in the unemployed ranks.

- For one large CIO union, however, wage increases now appear to be out of the question for 1955. President Emil Rieve of the Textile Workers Union says his group has written off wage boost demands this year because its industry "is and has been in its most serious depression in 20 years."

- New and unskilled workers are pulling for Congress to heed the recommendations of organized labor and Northern Democrats for raising the federal minimum wage from 75¢ to \$1/hour. President Eisenhower has asked for a 90¢ minimum.

- **Partiality Charged:** President O. A. Knight of the CIO's Oil Workers International Union (see also p. 18) is voicing a "strenuous objection" to the National Petroleum Council's recommendation to put the government's oil shale plant at Rifle, Colo., on a standby basis. Knight says his union will do all it can in working with certain congressmen in an attempt to override NPC's advice. He terms continuation of oil shale research "a vital national defense measure," and charges that the major oil company representatives who made up the council were opposed to shale oil "because it might adversely affect their business."

- **Fallen from Grace:** What it means for a left-wing labor union to lose its standing before the National Labor Relations Board was brought out last week by NLRB's ruling in the case of Precision Scientific Co. (Chicago) and the International Union of Mine, Mill & Smelter Workers—a union expelled from the CIO in 1950 as "Communist-dominated."

Last fall, an NLRB examiner upheld Mine-Mill's charge that Precision had refused to bargain; but last week, the board dismissed the charge. Reason: a few days earlier, NLRB had disqualified Mine-Mill because of an allegedly false non-Communist affidavit from union Secretary Maurice Travis.

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Plate and Frame Filter users will appreciate this new Eimco filter because it does **EASILY** so many of the jobs that were long tedious tasks on the conventional Plate and Frame Filter.

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Cleaning, which may take hours on the conventional machine, requires no down time on an Eimco, simply rotate the cleaned frame into position and start filtering again.

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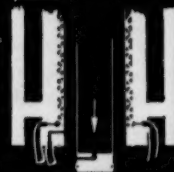
Write for complete information.



Plates open to allow frame to enter and position for filtering.



Plates closed on frame — in this position the feed, wash and blow portion of the cycle are completed.



Plates open to allow filled frame to move down and out.



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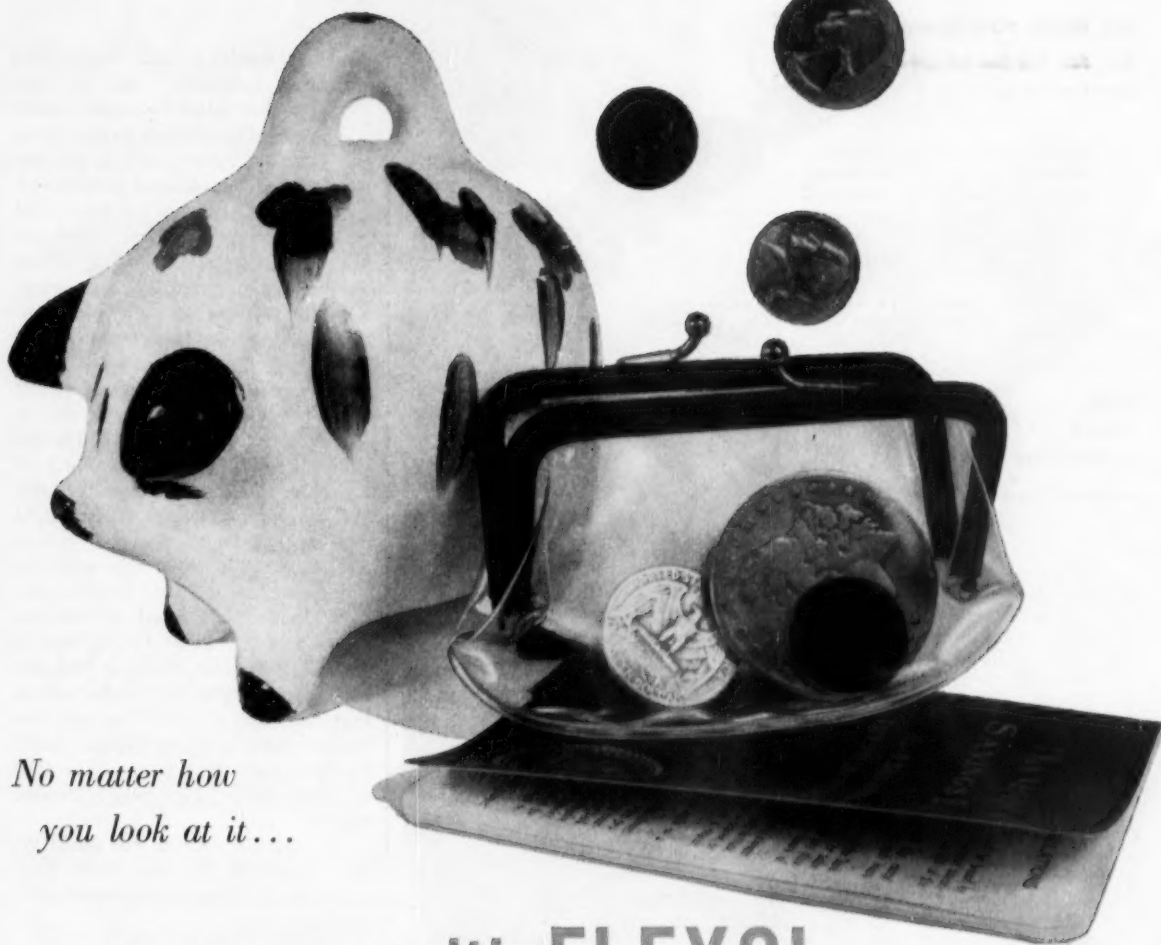


JUDGE FISHER: Stability is good, continuity not necessarily so.

LEGAL

Staggering Blow: Next month, the Illinois State Supreme Court will review the recent decision by Chicago Circuit Judge Harry Fisher that struck a blow at the system of electing corporate directors for staggered terms. Fisher's decision—which came as at least a tentative triumph for Louis Wolfson in his attempt to wrest control of Montgomery Ward & Co. away from intransigent Sewell Avery—could mean that, if the ruling is upheld, a number of Illinois corporations engaged in chemical process activities might have to amend their bylaws. Among the Illinois concerns that have been using the staggered-term system: Armour, Deere, Swift and U. S. Gypsum Co. If Fisher's finding—that the staggered-term system “may well lead to the perpetuation of error and mismanagement”—appeals to legislators and judges in other states, it could affect such firms as Anaconda Copper, Cities Service, Corn Products Refining, Eastman Kodak, Goodrich, National Lead, Pure Oil and Sinclair. Fisher conceded that stability in management is always desirable, but remarked that “whether continuity of the same individuals on the board insures stability may be questioned.”

Name Needn't Change: In Federal District Court at Toledo, O., Judge Frank Klobb has refused to “invoke the strong arm of injunctive relief” in a dispute between two chemical companies with



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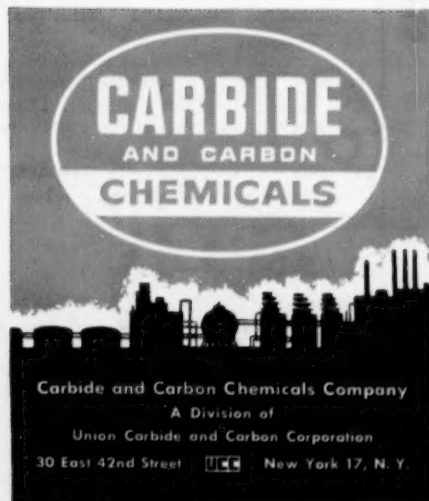
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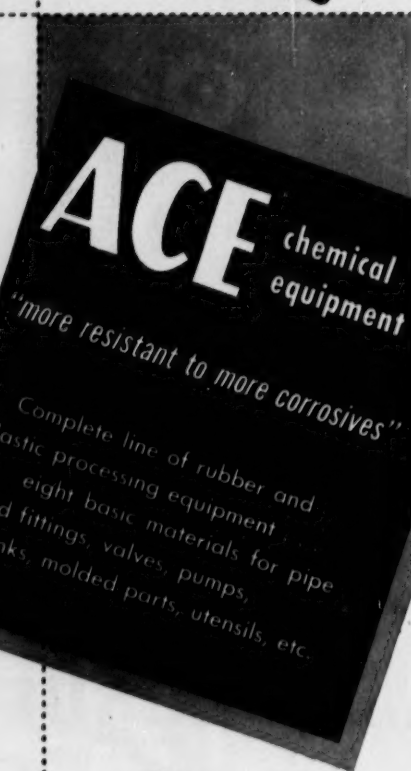


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B & I

somewhat similar names. Consolidated Chemical Industries, Inc., of San Francisco, had asked the court to order a Sandusky, O., company to stop using the word "Consolidated" in its corporate title. Consolidated Industrial & Agricultural Chemicals, Inc. Kloebe said he couldn't agree that continued use of the names would confuse or mislead the public, noted that with one exception the two companies deal in entirely different products.

Foam Suit Broadens: A second patent has come into issue in the isocyanate foam plastic lawsuit in U. S. District Court at Newark, N.J. When Du Pont and Nopco first crossed swords in this case several months ago, the spotlight was on Du Pont's Rothrock patent No. 2,282,827; now the suit has broadened to include disagreement over Du Pont's Hanford and Holmes patent No. 2,284,896, issued June 2, 1942. Du Pont is charging infringement of both patents; Nopco asserts that both are invalid. The case has been assigned to Judge William Smith for trial without jury, but the trial probably won't begin before December.

In an earlier item on this suit (CW, Jan. 29, p. 34), Nopco's Edwin Robinson should have been identified as vice-president.

KEY CHANGES . . .

George C. Wells, to executive vice-president, Union Carbide International Co., New York.

Rollo C. Wheeler, Christian deDampierre and E. S. Rothrock, to directors, Consolidated Chemical Industries, Inc., Houston.

Loren P. Scoville, to general manager, Chlorinated Products Division, Diamond Alkali Co., Cleveland.

Thomas G. Batchelor, to managing director, Hercules Powder Co., Ltd., Montreal.

D I E D

George E. Gollop, in Washington, D.C.; Fellow of the Chemical Institute of Canada, former vice-president of the Chemical Market Research Assn., past chairman of the Society of Chemical Industry (Montreal Section) and former special assistant to the president, Du Pont of Canada, Ltd., Montreal.

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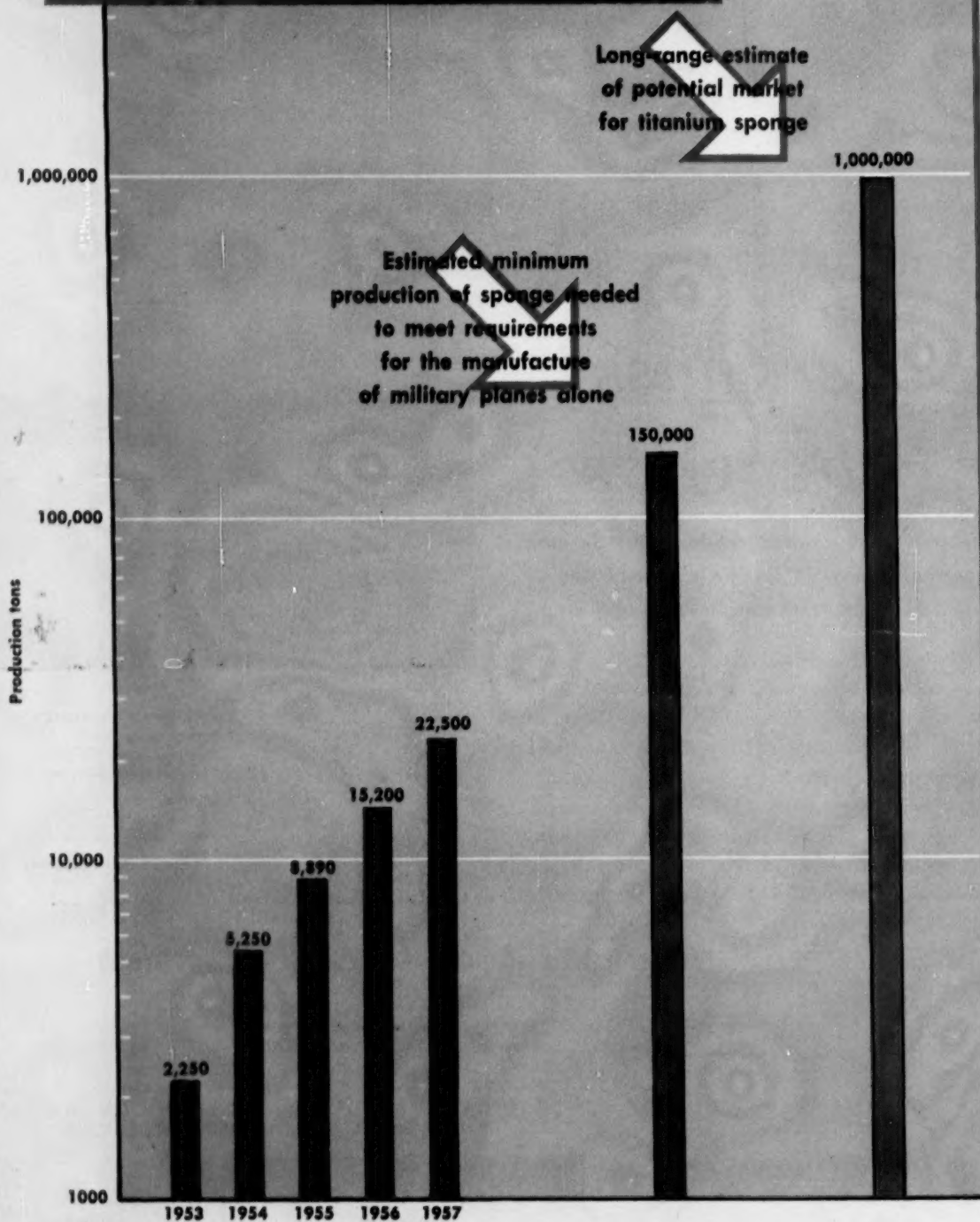


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February 19, 1955 • Chemical Week

33

Titanium: Far Along, Far To Go



Where Is Titanium Headed?

The metal prodigy, titanium, is still too expensive for most peacetime applications.

What's needed is a cheaper method of winning the metal from its ores.

Here are the firms that are in the field, how they're doing, where they're going:

If titanium were a baseball player, it would have walked off with every award for rookie of the year, hands down. But veteran baseball men would be insisting that a couple of years in the minors would do it a world of good.

For titanium is strictly a bonus baby. At the expense of millions of dollars, its development span, normally decades, is being crowded into years. Production of titanium sponge, only a few pounds in 1948, zoomed to over 5000 tons last year. But it's being pushed into the big time before it is ready.

The painful truth is that titanium is still a high-cost item that commands a negligible civilian market. Total consumption last year, in fact, was approximately the same as it was the year before, 1200 tons. Some people point to the fact that it has never fulfilled its early promise of giving superior performance at high temperatures;

despite its high melting point (3150 F), it probably will never find many jobs where it's called on to withstand temperatures over 1000 F. And its corrosion resistance, although considered excellent, may be somewhat below original estimates. There's even talk today of "substitutes" for titanium.

When Costs Come Down: Any pessimism on the general future of titanium, however, is not shared by men in the industry. They take justifiable pride in the progress that has been made: the rate of increase in production is without precedent; the quality of the sponge now being turned out is consistently high; and the sponge price was reduced last year from \$5/lb. to \$4.50/lb. The lack of big markets right now is, of course, nothing to worry about. Airplane builders, who will be the best customers for titanium in the immediate future, need a certain minimum amount before they can start using it to any large extent. When they

get that quantity, they'll start grabbing it up.

Civilian markets for titanium will develop rapidly enough when costs of producing the metal are brought down.

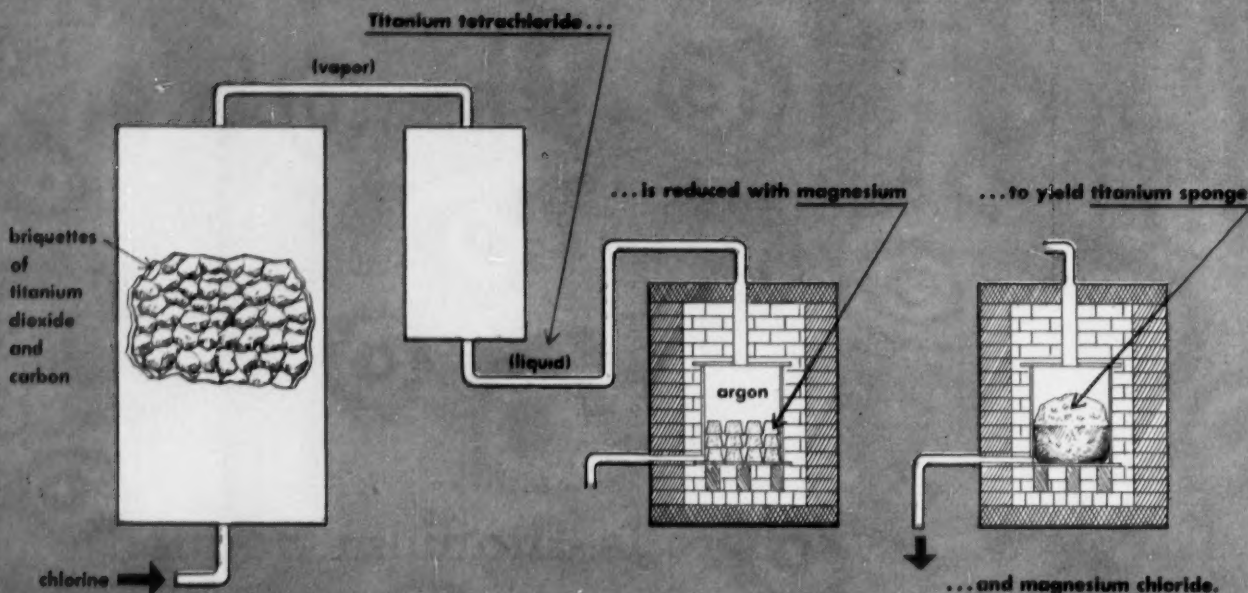
Who's in It

Getting the costs down is a technological problem that the chemical industry is ideally suited to solve, at least as far as production of sponge is concerned. In fact, the chemical industry has several stakes in titanium: a heavy-tonnage titanium industry would be a big customer for chemicals, and because of its corrosion resistance, one of the potentially largest markets for the metal itself is in chemical process equipment.

Significantly, the list of present and prospective titanium producers is heavily weighted with chemical companies. Here's a rundown of the principal firms involved, their present activities and their areas of interest:

Du Pont. The pioneer titanium producer, Du Pont started offering the metal for general sale in Sept. '48. It nursed the metal along slowly, built capacity up to 2½ tons/day. Then it entered into an agreement with the General Services Administration whereby it would add 7½ tons/day capacity. Last year, it reached its goal,

KROLL PROCESS FOR TITANIUM



C W Report

started producing—at Newport, Del.—at the rate of 10 tons/day. Presently, the firm is negotiating another contract with GSA that would call for another big plant, 7500 tons/year, at Waverly, Tenn.

Du Pont's interest in titanium is confined to the sponge; its principal customers: Republic Steel, Rem-Cru and Mallory-Sharon. It does, however, own deposits of ilmenite ore in Florida (at Trail Ridge and near Lawtey), which are mined for it by the Humphreys Gold Corp.

Du Pont is relying—for its present production (and very probably for any intended immediate expansion)—on a modified Kroll process (magnesium reduction of titanium tetrachloride). However, Du Pont is spending a million dollars a year on titanium metal

research and is carefully exploring other routes. In view of its present position, intense interest and past record of successful research, Du Pont is a sure bet to continue as one of the leaders in titanium development and production.

Titanium Metals Corp. Formed in Jan. '50, Titanium Metals is the offspring of National Lead and Allegheny Ludlum Steel. It is presently producing 10 tons/day at its Henderson, Nev., plant and is dickering with GSA for another contract that would boost its capacity there by 5400 tons/year.

TMC bills itself as the "world's largest integrated producer of ductile titanium." It employs rutile from National Lead deposits in Australia and—like Du Pont—employs a modified Kroll process to produce the sponge. But unlike Du Pont it utilizes the by-product magnesium chloride from the reaction to regenerate its own magnesium and chlorine. Thus, its main noncaptive raw material requirements are a make-up magnesium and chlorine (which is purchased from nearby Stauffer Chemical).

The sponge is melted into ingots at Henderson and at Allegheny Ludlum's

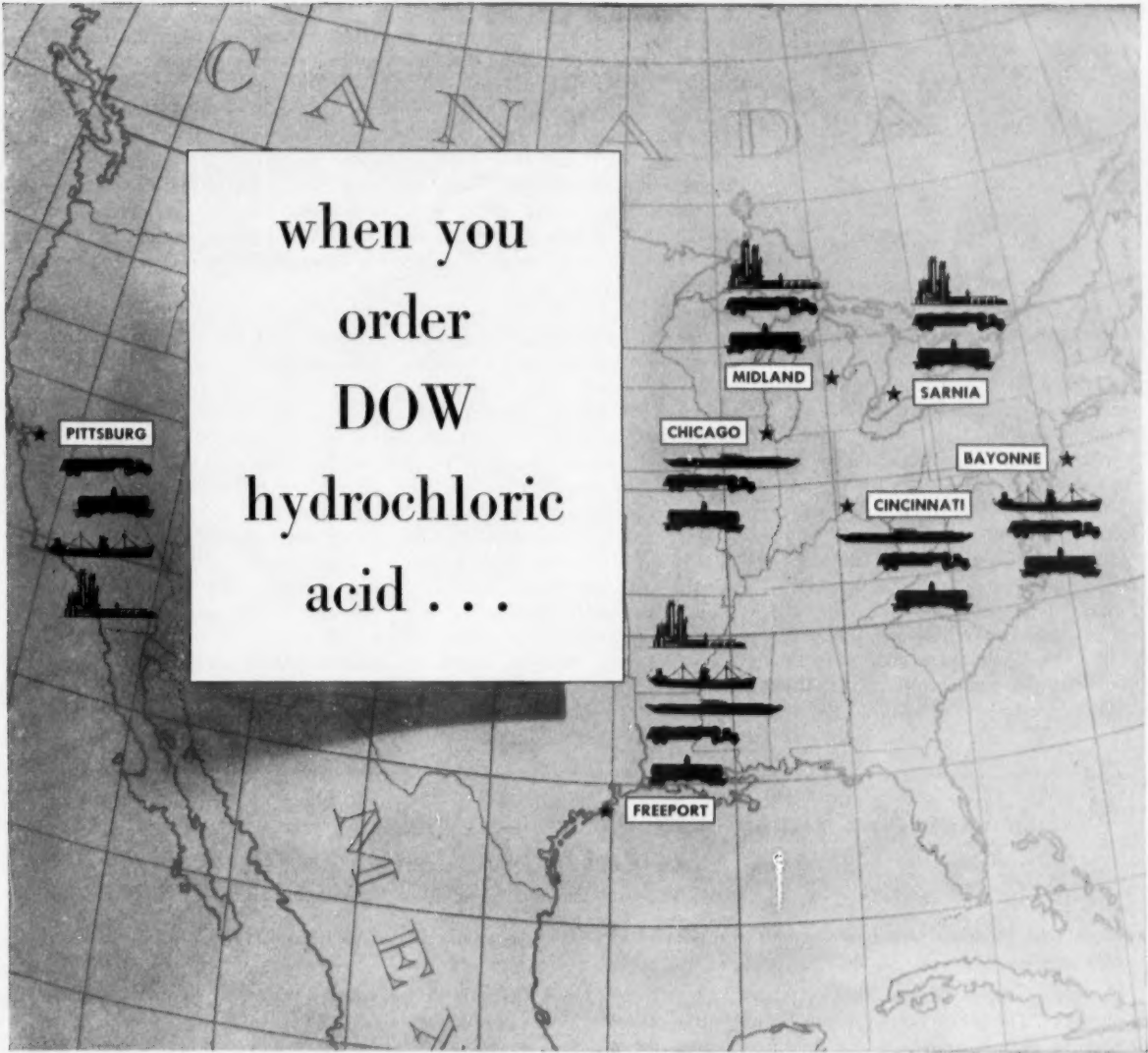
Watervliet, N.Y., plant. Ingots are processed into fabricated shapes at the Watervliet plant as well as at Allegheny Ludlum plants at Brackenridge, Pa., West Leechburg, Pa., Dunkirk, N.Y., Detroit and Los Angeles.

From its two parents, TMC has inherited qualities that should be important in the development of titanium: from National Lead, know-how in chemistry and titanium pigments, and from Allegheny Ludlum, know-how in stainless and high-steel alloys. The firm is also spending large sums (close to \$2 million/year) on all phases of titanium research. Along with Du Pont, it's likely to remain in the forefront of titanium producers.

Union Carbide and Carbon. Although not yet in commercial production, Union Carbide is building a big (\$31.5 million, 7500 ton/year) plant in Ashtabula to make titanium sponge. There it will employ a sodium—rather than the Kroll (magnesium)—reduction of titanium tetrachloride.

It will get sodium and chlorine from National Distillers, most probably will return by-product sodium chloride to the latter for regeneration.

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\$2 million researching its new sodium process, has for close to 15 years been studying various methods of producing titanium. Although it has no preferred raw material position, that's not a new experience for the firm. Its chemical business was built by setting up shop alongside refineries. Presently, its plans encompass only production of the sponge. But it isn't at all unlikely that the firm would eventually process the metal further. Although others have a running start in titanium, as far as commercial production is concerned, UCC is well set for the long haul with a solid record in both chemistry and metallurgy.

Dow. At its Midland plant, Dow is

using a modified Kroll process in a pilot unit capable of making 600 lbs./day. The next step is a 1½-ton/day plant, which should start up by July 1. Dow's agreement with the government calls for an 1800-ton/year capacity but that probably won't be in operation before next year.

Titanium is a natural choice for Dow, which occupies a dominating position not only in magnesium but also in chlorine.

Crane Co. Rounding out the roster of firms building plants is Chicago's big valve maker, the Crane Co. Through a subsidiary, Cramet, Inc., Crane is putting up a 6000-ton/year plant in Chattanooga, Tenn. First units were placed in operation last month, but capacity production isn't scheduled before the end of January, next year.

Also using a modified Kroll, Crane presently starts with Australian rutile. Within three months, however, it expects to meet much of its titanium requirements from its own mines in Florida and South Carolina.

One of the motives influencing

Crane's move into titanium was probably a desire to secure a captive source of titanium for its line of equipment (*CIW*, June 16, '51). Crane reports merely that it plans to melt some sponge and to sell some. It does add that it has made some titanium valves on order, has received a lot of inquiries on pipes and fittings as well as valves. As yet, however, it has done no serious work on any other equipment.

Ready to Go: Up to now, no other company has a firm commitment to build a commercial titanium plant. Harvey Machine, however, is looking for a GSA contract to put up a 6000-ton/year unit. And a number of other companies are either ready to build or are actively investigating titanium processes. Among them:

- Horizons Titanium is building a pilot plant to explore an electrolytic process. The firm has been eagerly tracking down electrolytic methods for several years, has developed at least two. Union Carbide, which did some research on Horizons electrolytic work,

Scorecard on Titanium Producers—

Present, Prospective and Potential

At present, there are only two commercial producers of titanium:

- Du Pont operates a 3600-ton/year plant at Newport, Del. The firm is currently negotiating with General Services Administration for a contract calling for a 7500-ton/year plant at Waverly, Tenn.
- Titanium Metals Corp. also has a 3600-ton/year plant—at Henderson, Nev. It is dickering with the government for an additional 5400-ton/year output at the same site.

Three others are currently building plants:

- Cramet, Inc., a subsidiary of the Crane Co., is putting the finishing touches on a 6000-ton/year plant at Chattanooga, Tenn. It brought the first four units of the plant in last month, expects to hit design capacity by the end of next January.
- Dow Chemical has contracted with GSA to build an 1800-ton/year plant at Midland. Dow now produces about 600 lbs./day in a pilot unit, expects to have facilities in place by July to produce 3000 lbs./day. Its 1800-ton/year capacity probably won't be completed before late next year.
- Union Carbide is putting up a 7500-ton/year plant

at Ashtabula, O., which it expects to have in production by next year.

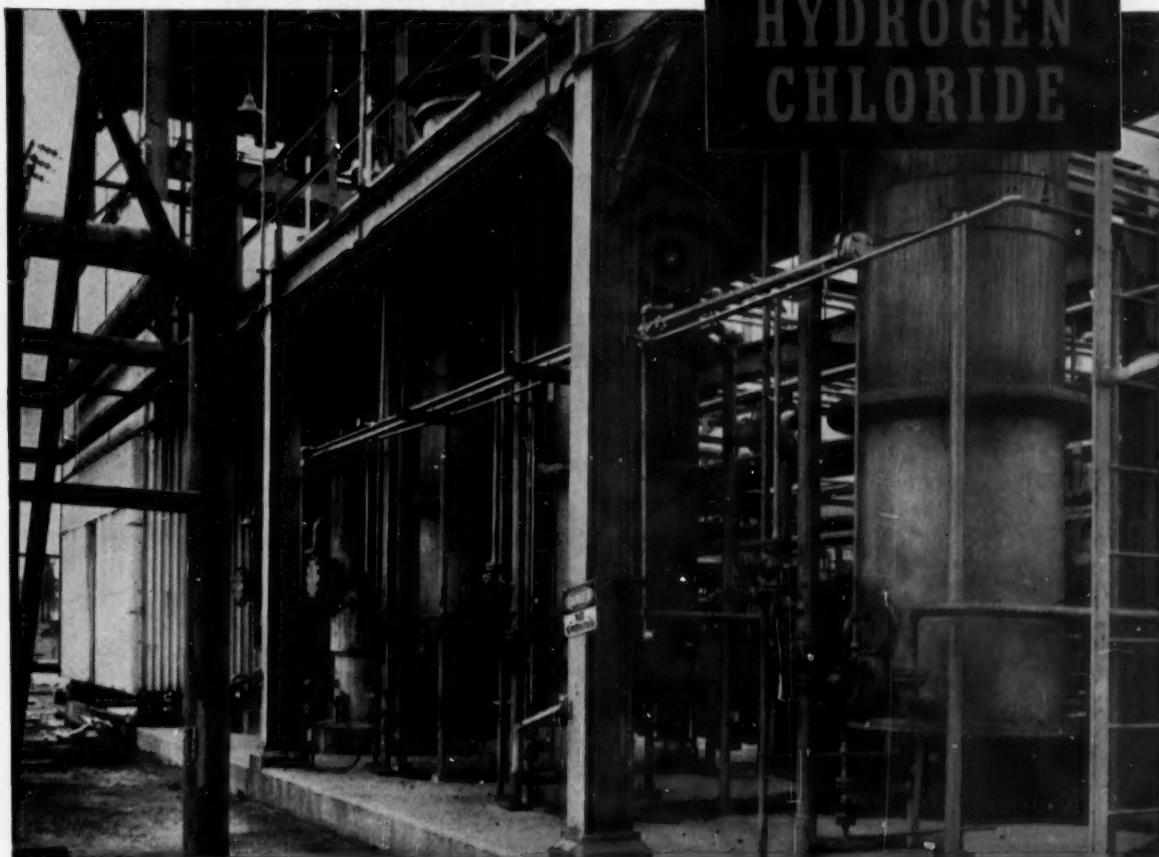
And another is negotiating with GSA to enter commercial production:

- Harvey Machine Co. would construct a 6000-ton/year plant.

Meanwhile, the government is encouraging development work on new processes:

- With a GSA loan, Horizons Titanium is building a plant in Stamford, Conn., to put its electrolytic process through the pilot stage.
 - Western Pyromet has leased an idle magnesium plant from the agency in order to advance its pilot work.
 - GSA is also considering a loan to pilot-plant a process developed by National Research and Monsanto.
- And a number of other firms, in varying stages of research and development, would probably figure in any second-round expansion:**
- Kennecott Copper (which is ready to build a 3-ton/day semicommercial unit), New Jersey Zinc, Kaiser Aluminum, the Clidden Co. (which has been cooperating with Bohn Aluminum & Brass on research), National Distillers, Anaconda Copper and Eagle-Picher.

New hydrogen chloride plant built for Pennsylvania Salt Manufacturing Company utilizes two processes. Here vaporized chlorine and hydrogen are converted to hydrogen chloride by controlled combustion in burners in foreground (Hooker process). A smaller quantity of hydrogen chloride is produced from a chlorine-rich eff gas in separate facilities also built by Girdler for Penn Salt.



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Where Are the Ores?

Titanium is estimated to be the ninth most abundant element in the earth's crust. In occurrence, the only structural metals that outrank it are iron, aluminum and magnesium. The only deposits presently of commercial significance, however, are rutile and ilmenite.

Rutile occurs throughout the world in conjunction with other titanium ores. Australia has large deposits, which are currently being used as a source of U.S. titanium. In the U.S., rutile is found in beach sands along the Atlantic, Pacific and Gulf Coasts. (The Du Pont deposits in Florida are actually leucocene, which contains rutile as

well as ilmenite and zircon). The largest known rutile deposits in the U.S. are in Nelson County, Va. Republic Steel recently decided to exploit rutile deposits in Mexico (CW, Jan. 1, p. 22).

Probably the world's largest deposits of titanium is the ilmenite-hematite mixture in the Lake Allard region in Quebec. In the U.S., the largest deposits of titaniferous ore are the ilmenite-magnetite reserves in the Adirondack Mountains of New York. Ilmenite also occurs in Virginia, the Carolinas, Minnesota, Rhode Island, Wyoming, Montana, California, Colorado, Tennessee and New Jersey.

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obtained licenses to use them. But though the Horizons processes are highly regarded in some quarters, apparently they're quite some distance away from commercial equipment.

• Kennecott Copper is ready to design a semicommercial plant using a continuous process put through the pilot stage at Battelle Memorial Institute.

By virtue of its two-thirds ownership of Quebec Iron and Titanium and its fabricating facilities (at Chase Brass & Copper), Kennecott looms as a potentially integrated titanium producer—from ore to finished product. The Canadian firm owns a huge ilmenite deposit (over 100 million tons) at Lake Allard in Quebec. The ore is smelted by a special process developed by New Jersey Zinc to iron and a titanium-rich slag. The slag is touted as being eventually one of the most important sources of titanium for the U.S. industry. The smelter ran into some bugs during its shakedown, however, and latest figures available show the Canadian firm is operating at a

loss. These difficulties are rapidly being ironed out.

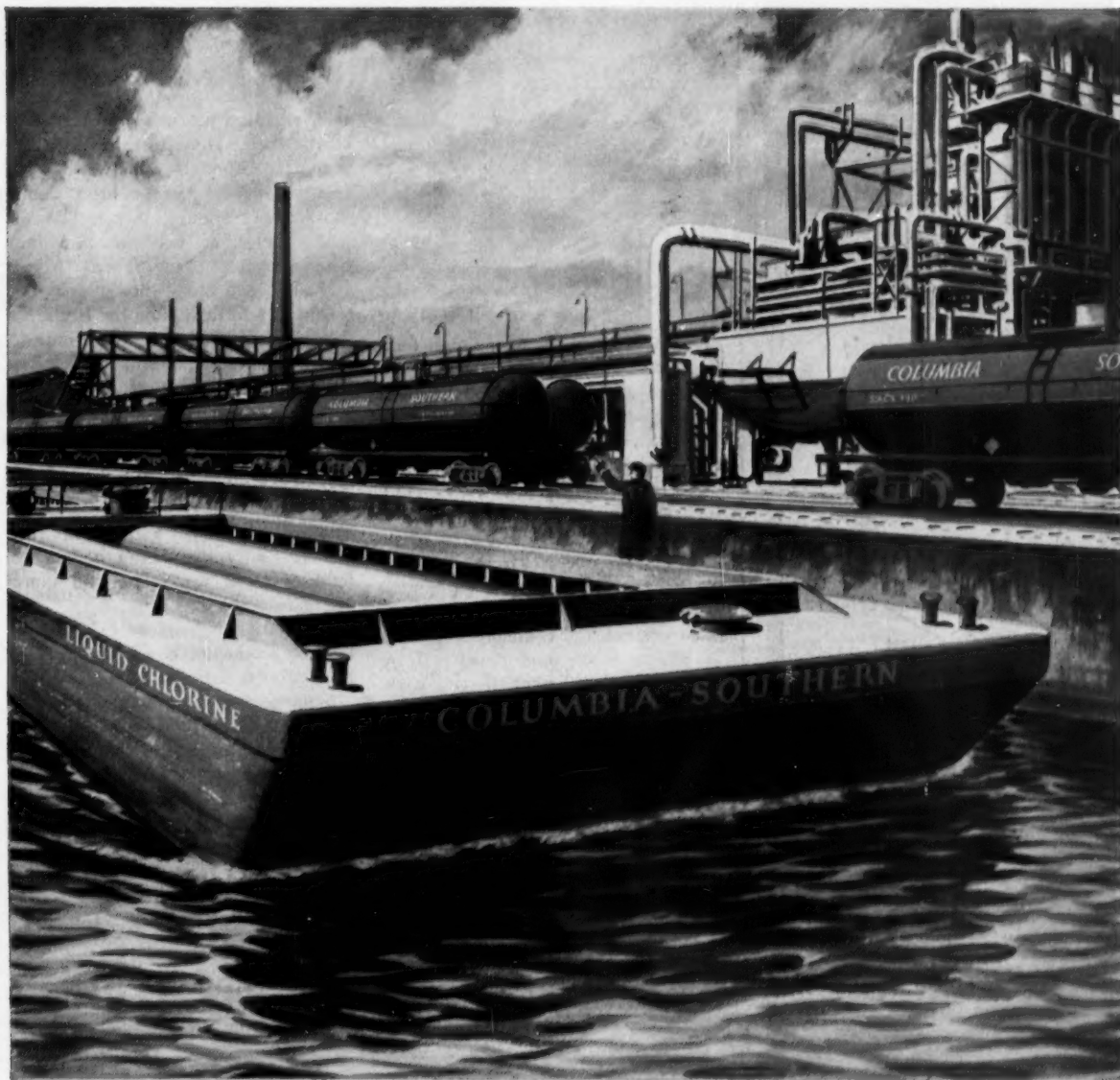
• New Jersey Zinc, the other owner of Quebec Iron and Titanium, is also a potential titanium producer. It's entering the field of titanium pigments through the purchase of American Cyanamid's Gloucester City, N.J., plant. It formerly produced a high-purity titanium (by the decomposition of titanium tetraiodide on a hot wire) and has been researching other routes to titanium for several years.

• National Research Corp. also qualifies as one of the pioneers in titanium. It has had a program on the metal since 1944. In 1950, it pooled its resources with Monsanto.

The combination proved out at least five processes on a small scale, but has two that it thinks look specially promising. Little is known about the results of the researches of the two companies. But the one closest to being commercial is claimed to require about one-third less capital investment than the Kroll process for a comparable plant and to involve substantially lower operating costs. It turns out crystals rather than a sponge but they can be handled the same way as sponges.

How It's Made

There are any number of processes capable of turning out a satisfactory titanium metal, many of which look simple on paper. But titanium has a



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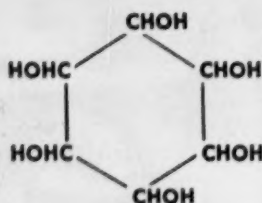
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high melting point and at high temperatures is innately fond of oxygen, nitrogen and other gases. And even small amounts of these impurities in the finished product can render the metal practically useless. In the molten state, moreover, titanium comes close to being the "universal" solvent. For these and other reasons, the problems in scaling up processes from laboratory apparatus to commercial equipment are staggering.

At present, the commercial process of choice is the one developed by William Kroll.* Essentially, it's a reduction of titanium tetrachloride with molten magnesium in a furnace to form titanium sponge and magnesium chloride (see illustration, Kroll Process for Titanium). The reaction is carried out in an inert atmosphere (usually argon).

Very little information is available on present commercial adaptations of

* Born in Luxemburg, Kroll now resides in Corvallis, Ore. He became interested in titanium in 1928, developed the process that bears his name in 1937 while consulting for Germany's Siemens and Halske. Not until 1945, however, when he joined forces with the Bureau of Mines, did he start receiving recognition for his work.

the Kroll process, for producers who have heavy research investments in their titanium processes are loathe to share their know-how with competitors. Although this attitude is understandable, there's little doubt that lack of communication has been a major deterrent to faster titanium development.

And because of the sparsity of technical information on the Kroll, it's virtually impossible for anyone outside one of the producing firms to make an economic assessment of it. But the Bureau of Mines (which last fall closed its titanium production facilities) has done considerable work on the Kroll and other processes and it has reported some figures (in "Production of Ductile Titanium at Boulder City, Nev.," R.I. 4519), is currently revising them in the light of more up-to-date and more extensive operations.

In addition, its engineers shed some light on production cost figures for the Kroll process at the Malone hearings.†

They said the bureau's production cost in August (1953) was \$3.80/lb. But a little over half of that went toward purchase of titanium tetrachloride. (Over 4 lbs. of tetrachloride are needed for 1 lb. of sponge.)

And preliminary figures showed a September cost of \$1.25/lb.—over and above the costs for raw materials. That would include

†The investigations of the Minerals, Materials & Fuels Subcommittee of the 83rd Congress, published as "Stockpile and Accessibility of Strategic and Critical Materials to the United States in Time of War."

Timetable on Titanium

Although titanium has attracted attention as a potential structural metal only in the last 5 to 10 years, actually it has been recognized for a century and a half. Some significant dates in its development:

- 1790. The Rev. William Gregor identified the element.
- 1795. Acknowledging Gregor's priority, Klaproth named the element titanium. Said he: "Wherefor no name can be found . . . which indicates its . . . properties, I think it best to choose a denomination as means nothing itself and thus can give no rise to any erroneous ideas . . . I shall borrow the

name . . . from the Titans, the first sons of the earth."

- 1910. Hunter prepared the first sample of relatively pure titanium by reducing the tetrachloride with sodium in a steel bomb.
- 1937. William Kroll developed the magnesium reduction process that bears his name.
- 1948. Du Pont offered the metal for general sale.
- 1950. Titanium Metals was formed by National Lead and Allegheny Ludlum Steel.
- 1954. Du Pont and Titanium Metals attained capacity production in their 10-ton/day plants.

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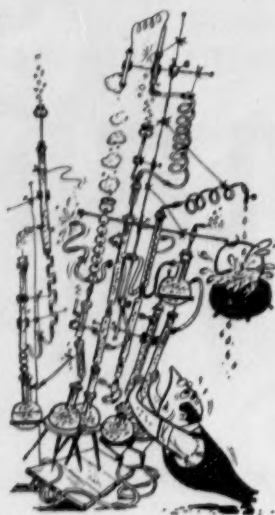
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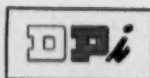
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Where Is Titanium Used?

Although there are a number of potential uses for titanium, very little metal has, as yet, found gainful employment as a structural metal. Here's a summary of some of the current applications for titanium according to the "1954 Supplement of the Metals Handbook":

- **Aircraft Gas Turbines.** Mainly, titanium is used in turbojet and turboprop engines as bar stock and forgings used to make compressor disks, spacer rings, rotating and stationary compressor blades and vanes, through bolts, turbine housings and linings and miscellaneous hardware. Titanium sheet is used for fire shields, brackets and shroud stock.

- **Airframes.** Titanium and titanium alloy sheet are being used in airframes of military and commer-

cial aircraft for both structural and nonstructural applications. Its primary use is to surround engines where service temperatures are between 300-700 F.

- **Fasteners.** Titanium and titanium alloys rivets, nuts, bolts and screws have been made, principally for evaluation.

- **Marine Uses.** Titanium and its alloys are being tried experimentally for several shipboard applications, like seats and disks in globe valves and metering disks in displacement fuel systems.

- **Chemical Processing.** Titanium is being used experimentally as a structural metal for pipes and fittings in contact with corrosive chemicals. It's also being studied for use in lightweight storage tanks for liquefied gases.

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labor, utilities, supplies and repairs, lab services and amortization. It would not include certain other items that a private concern would have to take into account.

The big raw material charges would be for magnesium and titanium tetrachloride. Purchased magnesium could be charged at 34-35¢/lb. The tetrachloride, however, is more difficult to figure because a captive source is one of the economic necessities for a titanium producer. Assuming smooth operating conditions, the bureau feels that it can be made for 15¢/lb. or less, so that the cost would be approximately 60¢/lb. of titanium sponge.

The bureau foresees a selling price for titanium, made by the Kroll process, of \$3/lb. in 5-10 years.

Power Needs: The Malone hearings also went into the subject of power requirements at some length. Actually

the need depends on a number of variables. For instance, about 14½-15 kwhr. are needed for a pound of sponge. But Du Pont, which uses electrically heated pots, needs up to 20 kwhr. Crane is expected to do the same thing. And Titanium Metals, which doesn't use electricity for that particular job, uses an equivalent amount to electrolyze magnesium chloride.* The titanium industry, then, with its projected production, will probably be a heavy user of electricity. But, at least presently, the other costs for titanium are so high that power costs are not a significant item in the finished product.

One of the big complaints against the Kroll method is that it's a batch process. In the past, there was some hope that it could be converted to a continuous one. This, however, now seems improbable. Says the Bureau of Mines' highly respected titanium authority, Frank Wartman: "... as far as the Kroll goes, I have about given up hope of a continuous process. Our work has gone to show that it is fundamentally a batch process in the same way that the open-hearth steel process is a batch process and can be

*This same equivalent energy, of course, is consumed, whether at the plant of the titanium producer or at the plant of the magnesium supplier.

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Surface area (nitrogen) 292 M₂/gram

PARTICLE SIZE DISTRIBUTION BY WEIGHT

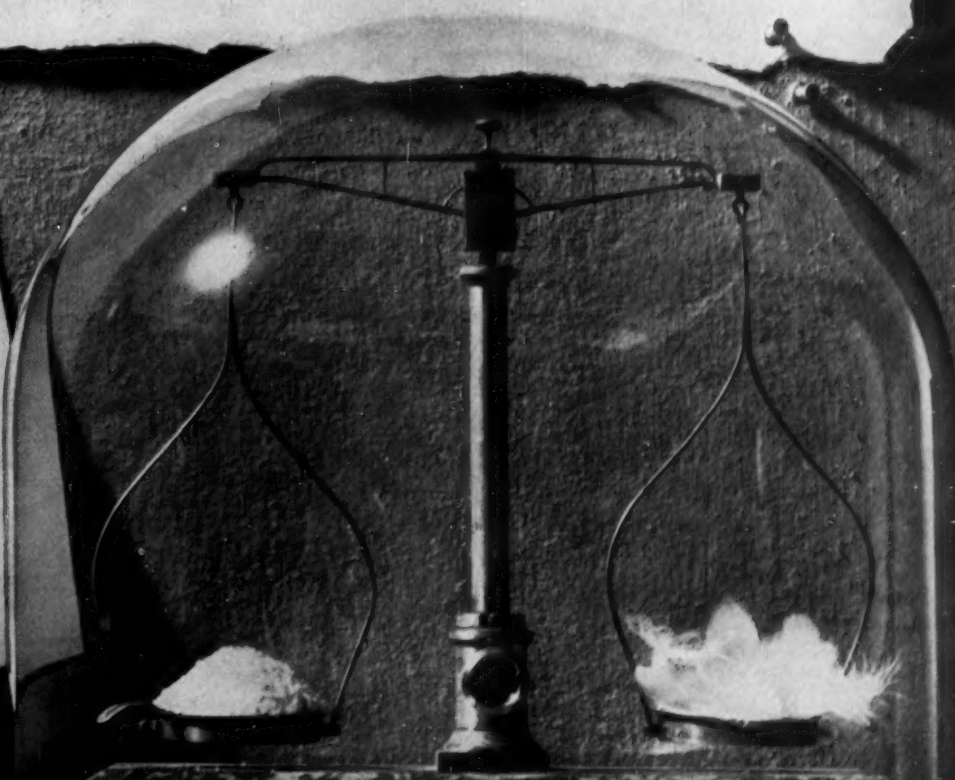
(water sedimentation)

5% less than 1.1 microns

10	1.4
20	2.0
40	3.0
50	3.7
60	4.5
80	7.0

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C W Report

most economically handled that way." Other investigators express similar opinions.

Alternate Reduction: Because it does seem to lend itself to continuous processing, sodium reduction is lately attracting a lot of attention. Briefly, the case for its use is this:

Sodium is a liquid at much lower temperatures than is magnesium (melting points are 97.5 C and 651 C, respectively). What's more, recent advances in sodium technology prove it can be pumped, metered and handled in process equipment. In addition it doesn't have to be cleaned as magnesium does.† And the by-product from the reaction is sodium chloride, more desirable from many standpoints than magnesium chloride.

But though sodium is considerably cheaper than magnesium, differences in raw material costs are not significant: a pound of magnesium produces

†Wartman and others from the Bureau of Mines told a gathering of the Electrochemical Society last summer that a considerably higher grade of titanium could be produced by the Kroll process if it were possible to buy magnesium ingots in a much purer form.

a pound of titanium, while it takes 1.9 lbs. of sodium to do the same job (assuming 100% efficiency for both systems).

There are not now any commercial plants employing the sodium reduction to make titanium. But Union Carbide will use it in its big plant in Ashtabula and Imperial Chemical Industries is trying it out in a 1500-ton/year plant due to start up this April.

Oddly enough, the sodium reduction was used to prepare what's generally credited as being the first relatively pure titanium metal. Hunter (in 1910) added purified titanium tetrachloride and sodium to a steel bomb. He then heated it to a dull redness at which time the reaction went forward almost instantaneously and explosively.

In fact the reaction has so much "oomph" that it was once discarded as a potential commercial route to titanium. Undoubtedly, Union Carbide feels that with its extensive experience in pyrometallurgy, it will be able to tame the reaction. But by the same token, it's a safe bet that Titanium Metals, Du Pont and the others considered sodium reduction. The fact that they chose magnesium instead must be heavily weighed by anyone trying to assess the economics of the alternate processes.

Catalytic Distillation: Other reducing agents have also been considered. One attractive idea has been to use

How Good Is Titanium?

Much excellent data has been published regarding titanium's corrosion resistance. It indicates that titanium corrosion resistance is superior for many troublesome chemicals. These are a few of the generalizations that can be made:

- Titanium metal is practically immune to salt water and marine atmosphere.

- It exhibits superior resistance to nitric acid, moist chlorine, chlorinated organics and inorganic chloride solutions.

- It doesn't seem suitable against boiling formic acid, sulfuric acid if chromates or phosphates are present, and phosphoric acid.

However, two facts should be

kept in mind when attempting to measure titanium's corrosion resistance:

- Most of the tests, so far, have been on a laboratory scale. Both Du Pont and Titanium Metals agree that the tests are not conclusive. The best test is to try the metal under actual service conditions for a particular application. Because of the scarcity of the metal, of course, work along those lines has not been extensive.

- The work that has been done has been concentrated on the corrosion resistance of the pure metal. Because the standard alloys are relatively new, tests so far have not been conclusive.

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C W Report

the sodium-mercury amalgam from a mercury chlorine cell. Kennecott Copper patented such a process (CW, Aug. 8, '53, p. 49) The idea has been shelved by Kennecott, however, at least for the time being.

Other ideas for titanium production range from distilling chlorides in the presence of hydrogen to reducing the finely divided dioxide with natural gas.

Perhaps the latest wrinkle is a process developed by Britain's Fulmer Research Institute. In it, the tetrachloride is passed over titanium ore to give up some chlorine to the ore. On reheating (in an inert atmosphere) the tetrachloride is regenerated, leaving beads of pure metal. Although the idea has some merit, the process will require a lot more work before economies are established.

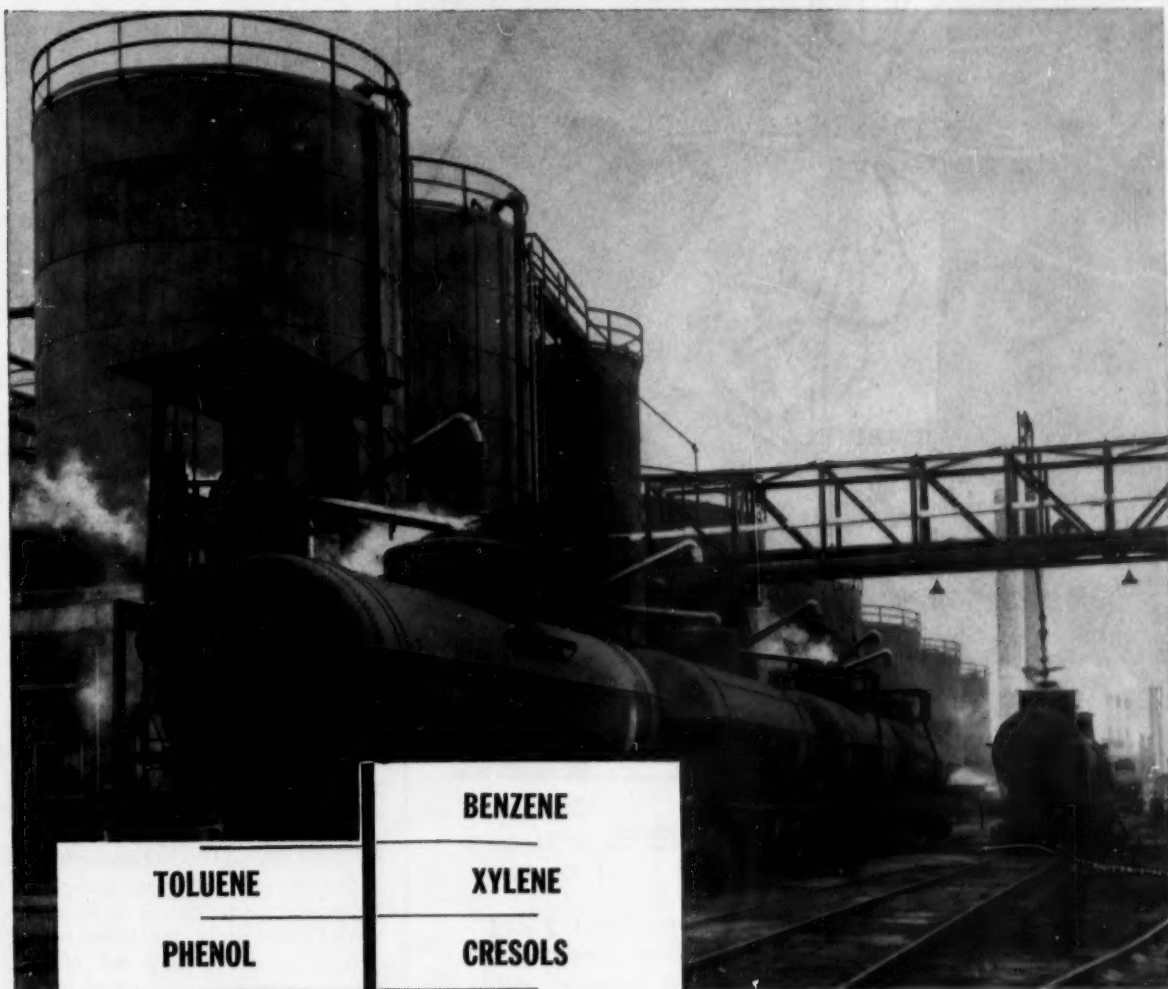
Looking for the Ideal: The ideal solution of titanium processing problems, of course, is an electrolytic process similar to the one used for aluminum or magnesium. All the firms actively researching titanium have at one time or another seriously investigated electrolytic approaches. (Right now, the U.S. Patent Office is facing the unenviable task of sifting overlapping claims on electrolytic processes from a number of concerns.)

But despite the efforts that have been expended, a practical, commercial electrolytic titanium process remains elusive. Several have reached the pilot stage, but it's doubtful that any will be ready for a commercial operation for several years.

And at this point at least, it's doubtful that an electrolytic process can turn out titanium at a cost comparable to that of aluminum or magnesium, even though the power requirements are of the same order. Here's why:

With aluminum or magnesium, you can use high-current densities because you're working above the melting point of the metal. And no matter how fine the droplets are, they'll coalesce. With titanium, on the other hand, you have to work below the melting point of the

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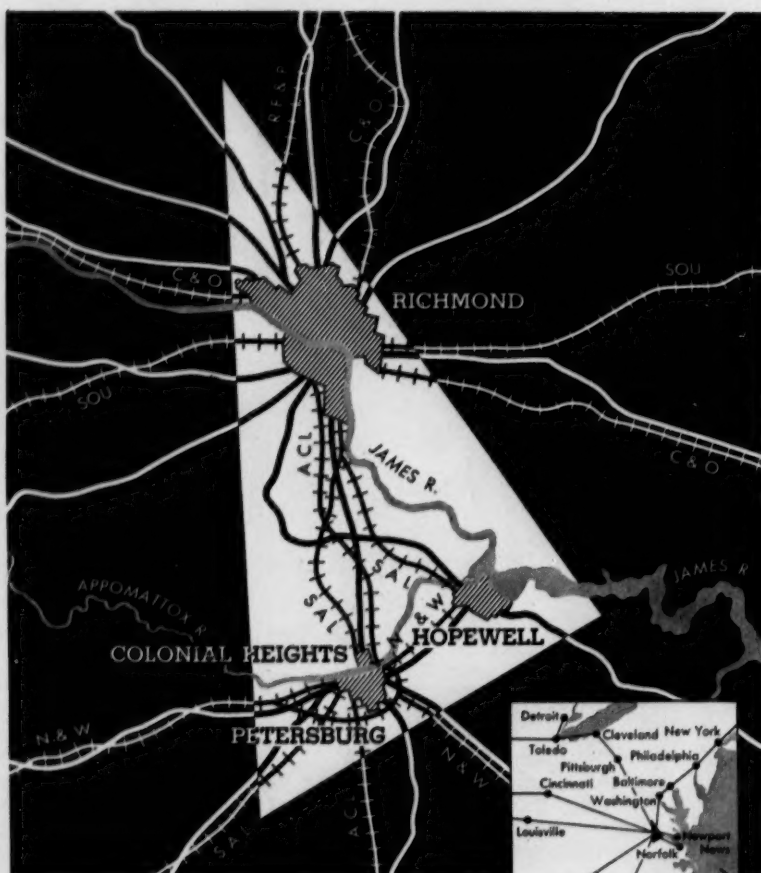
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metal and the droplets just won't coalesce. And since fine particles of titanium are unstable, you have to produce relatively large particles. That means lower current densities, bigger equipment and higher costs.

It doesn't mean that an electrolytic process would not be inherently attractive. But a lot of people, wise on titanium, are coming to the conclusion that a straight chemical process may be the answer to the titanium problem.

Melting It Down: Even after the sponge is formed, the titanium production problems are not over. Melting it into ingots, for instance, has to be carried out in an inert atmosphere so that the metal will not pick up contaminants. The choice of mold material is also important. For titanium at high temperatures either dissolves or is contaminated by refractories. Melting in a water-cooled copper crucible is now the most popular form of melting the sponge. Previously, graphite was employed, but it was found that the metal picked up carbon and the finished product had a lower formability, machinability and impact strength.

One of the big problems facing the industry is the reclaiming of titanium scrap. Testimony at the Malone hearings indicated that about 40% of the titanium sponge production ends up as scrap due largely to losses in turnings, borings and the scalping of ingots. Big strides, however, are being made against the scrap problem. Titanium Metals has a method of remelting the scrap that it thinks is the solution. Mallory-Sharon has a program for utilizing internal and external scrap. And Kaiser Aluminum and Chemical claims that the process it has developed for making the sponge can readily be adapted to recover scrap.

How Big Is the Market?

Trying to pinpoint the potential for titanium is like attempting to answer the question, how high is up? In both cases, you need a point of reference.



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The market for titanium at \$4.50/lb. (sponge) is considerably different from that for say, \$1/lb. metal.

Contracts already signed by the CSA will put the nation's annual titanium capacity at 22,500 tons. If the agreement being negotiated with Du Pont goes through, it would be pushed to 30,000 tons. And the other two contracts—with Harvey and Titanium Metals—would boost it over 40,000 tons. And undoubtedly the country can absorb that much sponge.

Because, even at the present costs, there is a sizable market for titanium—mostly a military one. The Air Force wants to take advantage of its weight-strength ratio in the 300-700 F range, which is superior to that of any other known material.

The Army wants it for its vehicles, ordnance and equipment for the foot soldier. A tank weighing 28 tons would weigh only 20 tons if titanium alloy were used in place of steel. That would give it more mobility, also make it more easily transportable by air. An 81-mm. mortar base plate, carried by infantrymen, would weigh only 22½ lbs. instead of 50 lbs.

In fact, at the Malone hearings, it was suggested that military planes needed a minimum of 150,000 tons/year and in case of war would be able to use as much as 800,000 tons/year. The Army, it was estimated, could use 1 million tons/year, if it were freely available.

Tied to Costs: In the final analysis, however, the market for titanium is inextricably tied to costs. The most immediate use for titanium as a peacetime metal is also in aircraft uses. Here's why:

A pound of weight added to an aircraft engine means 9 lbs. must be added to the weight of the airframe. Assuming a conservative cost of a modern plane of \$40/lb., you find that 1 lb. of weight saved by titanium can save \$400 on the cost of the plane.

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used titanium in its engines nacelles and other structural parts, was able to save over 200 lbs.—or the equivalent of one extra passenger and his luggage.

Cutting the Spread: Though the titanium industry seems married to the aircraft manufacturers for the immediate future, the process industries will probably end up eventually as one of the metal's best customers. There, its corrosion resistance and temperature range will be the important assets.

Before it is used to any large extent, however, the costs will have to be slashed. Presently, fabricated pieces are four or five times as expensive as the \$4.50 sponge. And though an economic reclamation process for scrap would reduce that spread appreciably, it's probable that finished pieces will remain at least three times as costly as the sponge.

Just how cheap the sponge can eventually be made is strictly a question of technological progress. Du Pont approached potential titanium customers, asking them how much metal they could use if the sponge were selling for \$1.25-1.50/lb. This cost, Du Pont feels is attainable (though purely hypothetical).

At that price, the tonnage could be of the same order of magnitude as stainless steel, approximately 1 million tons/year. It means a two-billion-dollar-a-year business in the sponge alone. And though such figures may be 20 or 30 years off, that's the reason for the chemical industry's interest in it. The prize is worth waiting for.

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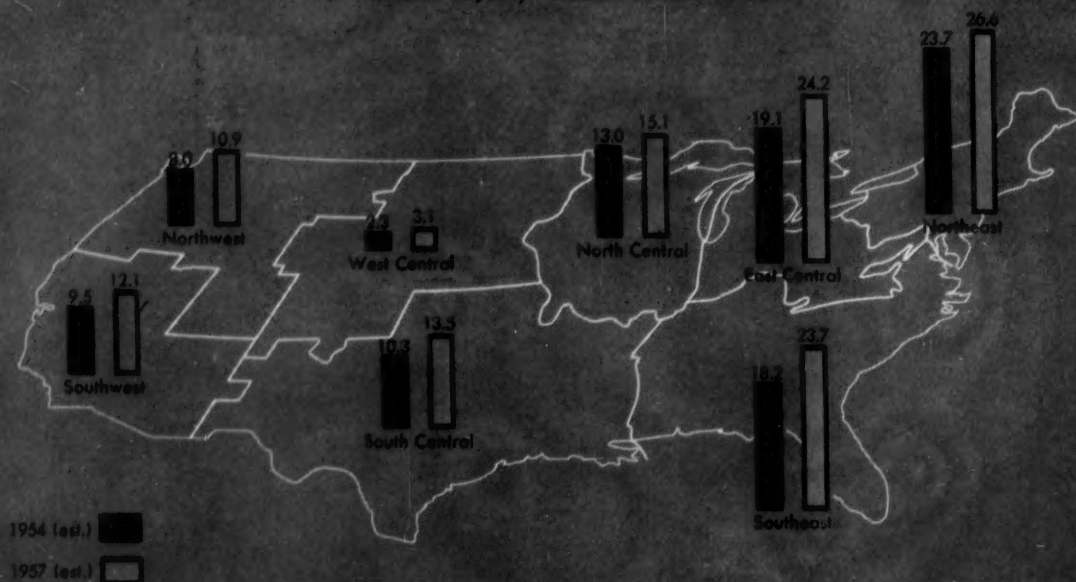
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Some Areas Are Growing Faster Than Others

Power Capacity — Millions of Kw



Source: Edison Electric Institute

Can Power Keep Up?

Despite record expansions, United States power supply is straining at the seams in its race to keep pace with growing industrial demands.

Outlook: For next three years at least, supply-demand situation will stay under control—but it won't be getting any better. Long-range appraisal is more favorable.

In the more immediate future, chemical men can look forward to adequate power availability, slightly higher rates. But there's wide variation geographically, and one area is threatened by a power deficit.

The ever-expanding superstructure of the processing industries rests on a base no bigger than the smallest fraction of a centimeter—the electron. To find out how strong the electrical base is, CHEMICAL WEEK queried power men throughout the nation last week, came up with an optimistic but tempered over-all outlook.

Can It Stand the Strain? Last year, the electric industry put its 100-millionth kilowatt of generating capacity onstream; by 1958, it expects to have

over 129 million kw. in operation. But in the same period, the national gross margin* is expected to fall from 19.3% (est.) to 18.5% (est.).

With industry growing as it is, utilities will have to make a tremendous

effort, say the experts, just to keep gross margin above the critical 15% in the next decade. Chemical and allied industries, already the second largest consumer of industrial electricity, continue to push their demand skyward: established companies are growing, new companies are entering the field; more and more petrochemical companies are going into high-energy-content chemicals such as ammonia. And even at 15%, says one production man, a system's gross margin suddenly could be knocked into a cocked hat by a new high-energy process initiated by one of the large chemical customers.

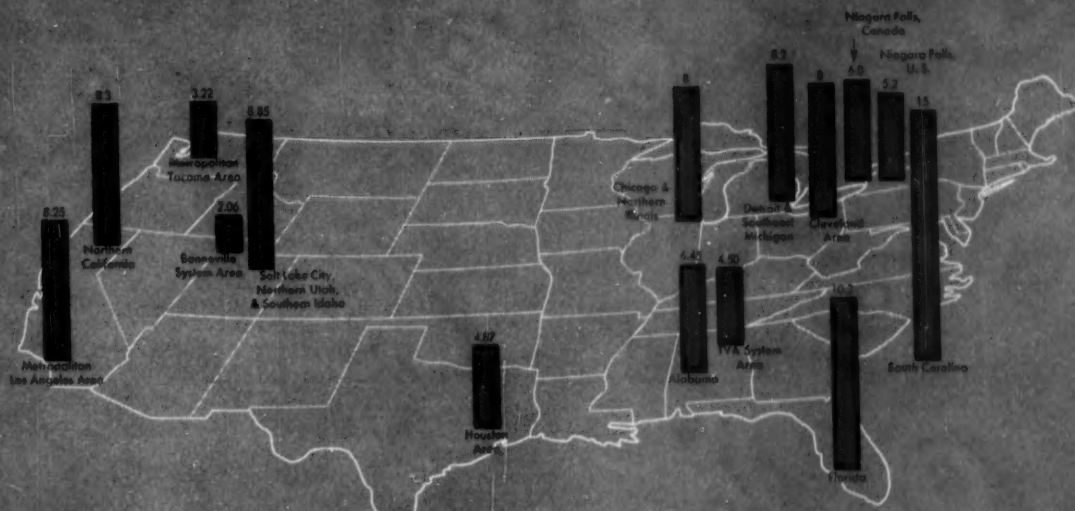
To heighten the drama, this country has just about exhausted its hydro resources, must turn to more costly means of future generation.

Thermal generation, becoming more efficient all the time, is of course the most immediate answer. Generators are getting bigger; boilers are operating at higher temperatures; and last year, for the first time, the amount of

* Figured as percent of peak load, this represents the difference between maximum capacity and maximum demand taking December as the key month. To carry peak loads, allow for scheduled and unscheduled equipment outages, permit routine maintenance and provide for unforeseen loads, says the Electric Power Survey Committee, capacity should exceed demand (i.e., gross margin) by 15% for the country as a whole.

Power Costs Less In Certain Areas

Average Cost to Chemical Consumer — Mills/Kwhr at Metering Point



coal required to produce one kwhr. of electricity (in 1882, it took 10 lbs. of coal to do the job) dropped below one pound (0.99). Even so, figure the experts, it will be atomic power's task to plug the gap created by continued industrial expansion.

It will be about 10 years before the first large atomic reactors go on-stream. Their combined capacity at that time may reach one or even two million kilowatts, but demand is expected to climb close to 200 million kw. by then. Another 10 years, however, and atomic power could account for as much as 25% of an anticipated demand of from 300 to 400 million kw.

Even so, over-all demand will continue so high that experts can't foresee the time when nuclear power will actually take any business out of the lines of conventional fuel-burning and hydraulic plants, to say nothing of putting them out of business altogether. Consequently, all over the country this week, power men are going ahead with plans for expanding current power supplies.

United States

Power Highlights

Capability (millions kw.): 1954 (est.), 104.2; 1957 (est.), 129.3. Gross margin: 1954 (est.), 19.3%; 1957 (est.), 18.5%. Expansion 1954-57, %Hydro: 11%.

Spot shots: Bonneville Power Administration (Federal System)—rates (average to chemical and allied consumers): 2.06 mills/kwhr.; rate changes: 0.96% decrease in 1954, none planned for two years; Tennessee Valley Authority (Federal System)—rates (average to chemical and allied consumers): 4.50 mills/kwhr.; rate changes: 0.61% decrease in 1954.

The U.S., as a world producer of electricity, is nearly four times ahead of its closest competitor, U.S.S.R. The federal government, as an individual power producer, however, is about six times behind top-spot investor-owned utilities. Nevertheless, the government does hold down second place, and, despite official attitudes to the con-

trary, it is tightening its hold through increasing supply from established projects such as TVA and Bonneville, by establishing new power projects such as the Pick-Sloan works (see *West Central, below*). Of an anticipated 37-million-kw. expansion from 1954-57, the federal government will account for nearly 22% as contrasted with 72% for the investor-owned utilities.

Most of this federal power going directly to consumers was by and large taken by big industrial users. For the chemical man with ideas of expansion, this augurs well for low power rates—if past performances hold—provided he can locate his plant on a federal outlet.

Northeast

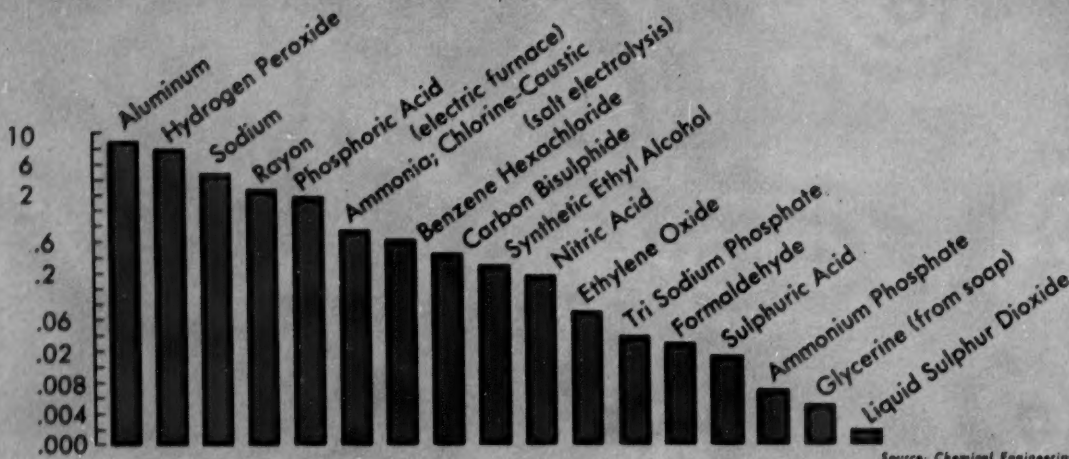
Power Highlights

Capability (millions kw.): 1954 (est.), 23.7; 1957 (est.), 26.6. Gross margin: 1954 (est.), 17.7%; 1957 (est.), 14.0%. Expansion 1954-57, %Hydro: 8%.

Spot shots: Niagara Falls, N.Y., industrial area—rates (average to large consumers, including chemical): 5.3 mills/kwhr.; rate

Where Is Your Product On The Power Scale?

*Energy Consumption — Kwhr/lb. of product



Source: Chemical Engineering

changes: none in 1954, none scheduled for 1955; Niagara Falls, Ont., industrial area—rates (large consumers, including chemical): 6 mills/kwhr.

This area has long been one of the nation's power leaders. Scheduled expansion over the next three years will keep the region in its top spot at least through 1957. But at the same time, area gross margin is expected to fall below the critical 15%. Consequently, growth-conscious production men are keeping a receptive but wary eye on the area.

For regional power men, there are other things to watch: local hydro development, for example, is fast approaching its limit. And in New York, private utility men are still battling the government for the right to develop new generation at Niagara Falls.

On the other hand, power rates have pretty well held the line. Niagara Mohawk, for instance, serving chemical-heavy Niagara Falls, has kept its average industrial charge close to '52's 5 mills/kwhr. On the Canadian side of the Falls, Ontario Hydroelectric hasn't held its rate reins quite as tight, and industrial costs have moved ahead of their U.S. counterpart—from about 4.5 mills/kwhr. in '52 up to 6 mills/kwhr. last year.

Over the same period, however, Canada as a whole has pushed its capacity from 11.8 million kw. to 13.9

million kw., still seems a land of promise to the power-hungry chemical industry.

East Central

Power Highlights

Capability (millions kw.): 1954 (est.), 19.1; 1957 (est.), 24.2. Gross margin: 1954 (est.), 22.1%; 1957 (est.), 17.8%. Expansion 1954-57, %Hydro: 0.

Spot shots: Cleveland industrial area (1700 sq. miles)—rates (large consumers, including chemical): 8 mills/kwhr.; rate changes: 5% increase to take effect in 1955, no change in 1954; southeast Michigan (7600 sq. miles, including Detroit, Port Huron, Ann Arbor, Monroe)—rates (average to chemical industries): 8.2 mills/kwhr.; rate changes: none in 1954, none scheduled for 1955; Lower Michigan (60 counties, excluding Metropolitan Detroit, including Wyandotte)—rates (large chemical consumers): 8 mills/kwhr.; rate changes: none in 1954, none scheduled for 1955.

Second only to the Northeast in power capacity, this region has and will continue to have one of the higher gross margins in the country despite an anticipated 4.3% fall off by 1958. It is as a result one of the most reliable spots, experts feel, for any immediate expansion plans.

On the other hand, hydro developments don't figure in the area's future expansion. Too, industrial power rates run somewhat higher than in the Northeast, average out to about 8 mills/kwhr.; and in the 1700-sq.-mile Cleveland industrial area, rates will go up 5% this year.

Nevertheless, new chemical plants such as Union Carbide and Carbon's titanium unit (Ashtabula) and Hooker Electrochemical's caustic-chlorine works (Montague) keep coming in, forcing utilities such as Cleveland Electric Illuminating and Consumers Power to expand in anticipation of huge power drafts.

Some chemical companies in this region that have heavy power-consuming operations or that use by-product heat or steam, e.g., Pennsylvania Salt (Wyandotte) and Dow Chemical (Midland), generate their own electricity; others, such as Wyandotte Chemical, produce some of their own power; while another, Sharples Chemical (Wyandotte), buys captive power across the street at Pennsylvania Salt. But by and far, most of the plant managers prefer to get their power from investor-owned utilities.

Southeast

Power Highlights

Capability (millions kw.): 1954 (est.), 18.2; 1957 (est.), 23.7. Gross margin: 1954 (est.), 11.1%; 1957 (est.), 10.6%. Expansion 1954-57, %Hydro: 8.

Spot shots: South Carolina (23 counties, including Charleston)—rates (contract to average plant, which is small, including chemical): 15 mills/kwhr.; rate changes: none in 1954, none scheduled for 1955; Alabama (excludes 13 northern counties served by TVA)—rates (average to chemical and allied industries): 6.5 mills/kwhr.; rate changes: none in 1954; none scheduled for 1955; West Coast Florida—rates (average industrial, including chemical): 11.5 mills/kwhr.; rate changes: none in 1954, none scheduled for 1955.

Currently, third in power capacity, this region—counting federal projects—is expected to make the greatest gain in capability over the next three years. By 1958, it will be a hair's-breadth—a scant 0.5 million kw.—behind East Central in second place.

But the Southeast is expected to have the smallest gross margin in the country in 1957—over 4% below the critical 15%. And, not counting federal projects, rates to chemical and allied companies range all over the region—from a South Carolina high of 15 mills/kwhr. to an Alabama low of 6.45 mills/kwhr.—and average out comparatively high in national standings.

Consequently, it is the cautious power consumer, say plant men, who settles in this area, even though there were few rate hikes granted last year or probable this year.

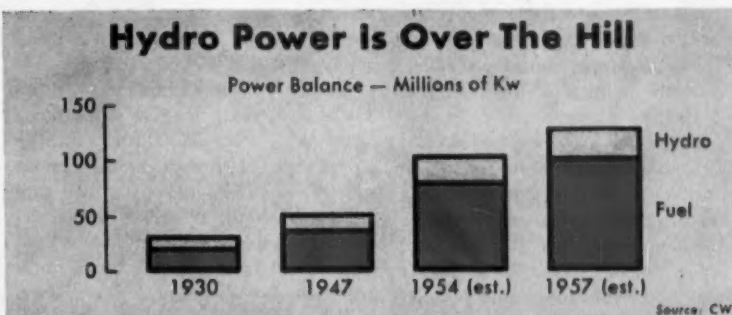
North Central

Power Highlights

Capacity (millions kw.): 1954 (est.), 13.0; 1957 (est.), 15.1. Gross margin: 1954 (est.), 16.3%; 1957 (est.), 13.5%. Expansion 1954-57, %Hydro: 0.

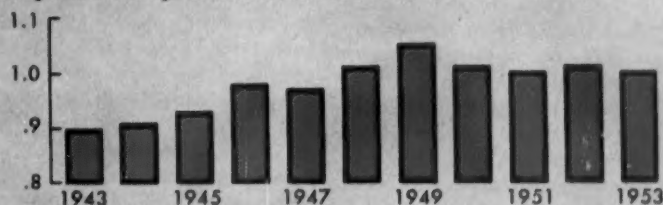
Spot shots: northern Illinois (including Chicago)—rates (large industrial users, including chemical): 8 mills/kwhr.; rate changes: none anticipated in 1955, 6% increase in 1954.

Despite an explosion last December at Stickney, Ill., that took 640,000 kw. off the lines, this region still holds fourth spot in national capability ratings, will keep this position through 1957 by virtue of currently planned expansion. But in gross margin standings, North Central figures to slip from fifth to seventh, drop from 3.6% above



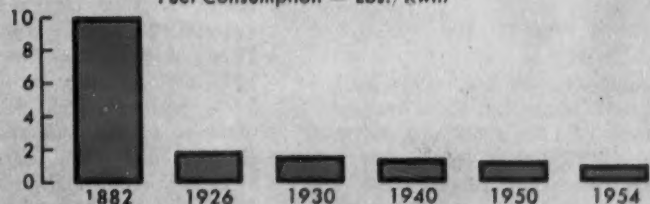
This Could Mean Higher Contract Rates . .

Average Cost to Large Industrial (Includes Chemical) Users — Cents/Kwhr



.. On The Other Hand, Generators Have Become More Efficient

Fuel Consumption — Lbs./Kwhr



critical mark to 1.5% below by 1958.

As far as industrial rates go, the area compares well with East Central. For the large consumer in the Chicago-northern Illinois area served by Commonwealth Edison, it's about 8 mills/kwhr. Rates went up last year, about 6%, for the first time in Commonwealth's 66-year history.

The region as a whole is dependent primarily on coal-based power. All present expansion plans revolve about thermal generation—also mostly from coal, with some power coming from natural gas and, rarely, from oil. By and large, the North Central region looks like a good bet for limited expansion.

South Central

Power Highlights

Capacity (million kw.): winter con-

dition, 1954 (est.), 10.3; 1957 (est.), 13.5; summer conditions, 1954 (est.), 9.9; 1957 (est.), 13.4. Gross margin: winter conditions, 1954 (est.), 48.6%; 1957 (est.), 46.7%; summer conditions, 1954 (est.), 17.6%, 1957 (est.), 16.9%. Expansion 1954-57, % Hydro: 2%.

Spot shots: Houston, Tex. (area within 60 miles of Houston, excluding Texas City and Sweeney)—rates (large industrial users, including chemical): 4.9 mills/kwhr.; rate changes: none in 1954; none scheduled for 1955.

Here, the power situation is uncommonly conditioned by seasonal variation. As noted above, capability varies insignificantly, but gross margin drops drastically during the summer, mainly because of rising demand during these months. Yet, year 'round, the gross

margin is still above the critical point and will stay that way at least through 1957, but anyone considering the area as a future plant site must keep in mind the lower summer margin, the fact that even after expansion and under optimum conditions the South Central region will still rank fifth in regional capacity at the end of 1957.

To compensate for this seasonal variation and to assure reliable power supply, many of the plants (among them, numerous chemical companies such as Dow) generate at least part of their own power needs. In fact, the area within 60 miles of Houston has one of the highest concentrations of individual generation in the country with utilities and private plants splitting the job right down the middle.

Generating all power from readily available natural gas, this same Houston-hubbed area also has one of the most attractive private rate scales in the country, with the large consumer taking his power off the line at less than 5 mills/kwhr. In this respect, most of the remaining region proves about equally attractive to plant men, and undoubtedly will continue so.

West Central

Power Highlights

Capability (millions kw.): 1954 (est.), 2.3; 1957 (est.), 3.1. Gross margin: 1954 (est.), 34.5%; 1957 (est.), 38.1%. Expansion 1954-57, % Hydro: 63%.

Spot shots: northern Colorado (includes southeastern Wyoming)—rates (average to large chemical and allied customers): 7.8 mills/kwhr.; rate changes: 5% increase took effect Feb. 1955, first in utility's history.

High in gross margin (No. 2), this region is last in capability and seems assured of continued, uncontested possession of the spot for some time. What development is being carried out is mostly hydro (63%—second highest in the country) and the federal government is doing over 60% of the work, much of it as an adjunct to flood control and navigation operations.

One of the most ambitious projects in this region, for example, is the proposed \$80-million Pick-Sloan plan for development of the Missouri River Basin. This project, currently hinged to Congressional action on the President's budget, would be carried out

under the aegis of the Army Engineer Corps and the Interior Dept., would add over 1 million kw. to capacity.

But if area development seems retarded, it is in part offset by a fairly good rate structure. Throughout the lower regional reaches, Public Service Co. of Colorado, despite a 5% rate hike this month (the first in its history), is selling power to large consumers in northern Colorado and southeastern Wyoming at less than 8 mills/kwhr.

Even so, the over-all region is relatively light in chemical development, and this condition could remain static for some time. But if the area has little to offer for chemical firms, it does have oil and gas for the petroleum firms; and for the nonce at least, is enjoying a petroleum-based boom.

Northwest

Power Highlights

Capability (millions kw.): 1954 (est.), 8.0; 1957 (est.), 10.9. Gross margin: 1954 (est.), 12.1%; 1957 (est.), 21.2%. Expansion 1954-57, % Hydro: 91%.

Spot shots: Tacoma area (includes chemical concentration in Puget Sound)—rates (average to chemical and allied users): 3.2 mills/kwhr.; rate changes: none in 1954; probable slight increase in 1955; northern Utah (includes southern Idaho)—rates (average chemical and allied user): 8.8 mills/kwhr.; rate changes: none in 1954, none scheduled for 1955.

This region, underpinned by the Bonneville federal power system, has one of the best rate structures in the country. Even the heavy cluster of chemical companies in the Puget Sound area getting private power from Tacoma City Light pays charges only slightly more than 3 mills/kwhr. The rate schedules for the Seattle-Tacoma area actually goes down as low as 1.5 mills/kwhr. for large blocks of power at a 100% load factor. Toward Bonneville's lower extremities, in Utah, rates are quite a bit higher, but still comparable with those in other parts of the country.

The Northwest also has other distinctions: for the 1954-57 span, it has the highest percentage of hydro expansion (91%) and the highest percentage of planned federal projects (78%). More significant, under adverse hydro conditions the western part

of the region is the one section of the country where gross margin actually shows a deficit. This condition is expected to continue through 1956. (For the rest of the country, adverse hydro conditions have no special significance; therefore, throughout, all other calculations are based on median conditions.)

Consequently, the choice of the region as a future site for plants is a toss up. For those interested in low rates and unconcerned about power interruptions, of course, it is ideal. But for those companies that are vitally dependent upon continuous power supply (CW, Nov. 8, '52, p. 26) it's a big gamble.

Southwest

Power Highlights

Capability (million kw.): 1954 (est.), 9.5; 1957 (est.), 12.1. Gross margin: 1954 (est.), 16.7%; 1957 (est.), 21.5%. Expansion 1954-57, % Hydro: 10%.

Spot shots: Metropolitan Los Angeles area (includes Los Angeles and Orange Counties)—rates (large industrial users, including chemical): 8.3 mills/kwhr.; rate changes: one in 1954, uncertain for 1955; northern California (89,000 sq. miles north of Tehachapi Mts.)—rates (average chemical user): 8.3 mills/kwhr.; rate changes: none in 1954, none foreseen in 1955.

Expansion over the next three years will keep the Southwest area in its No. 6 capability slot, but will move it up one notch in gross margins from No. 4 to No. 3. Rates, while not the best, are certainly workable from the industrial customers' angle.

On the other hand, the immediate outlook for rate increases is questionable, at least in the metropolitan Los Angeles area. Southern California Edison who, together with the Los Angeles Dept. of Water & Power, supplies about 99% of area power, upped its rates about 12.8% last year, but this was only 53% of what the company wanted. And while the L. A. Dept. of Water & Power did not increase charges last year, it won't commit itself on prospects for 1955.

As for federal power, it plays a relatively minor role in this region. In central and northern California, it accounts for perhaps 10% of total generation. Considered opinion on the over-all area: it's better than a fair bet for future plant location.

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DISCUSSION GROUPS of six or seven people under a trained leader promise to meet research's biggest challenge . . .

Upgrading the Human Element

Organized group discussion is a new and effective means of developing administrative leadership in research and development personnel.

Here's how the method works, what it offers, how it may be put into practical operation:

Smart management men have always acknowledged that a research department is as good as the people who run it. But only recently has industry begun a serious search for ways to upgrade its human scientific resources. This effort, still conspicuous by its novelty, is concerned with the emotional rather than the scientific side of the researcher's professional life—in the case of the research executive, it seeks to help him become as adept at handling people as he is proficient with apparatus and equations.

One of those working in this fascinating area of human relations is Walter D. Woodward, M.D., a psychiatrist who sees the chemical industry from the inside. In his American

Cyanamid Co. office, 59 floors above the busy streets of New York's Rockefeller Center, Psychiatrist Woodward this week gave CW his ideas on how good research executives are made.

"It's not enough for your research director to be scientifically first rate," he declares. "Ideally, he should also have the qualities of a good leader: he must inspire the trust and confidence of his people; he must be able to delegate authority; and he must not meddle in the day-to-day work of his staff.

"There are no pat rules for achieving these goals," Woodward cautions. But he believes that progress can be achieved by the use of the relatively

new psychological technique of organized group discussion, coupled with an awareness of the personality pitfalls of corporate society.

One of the principal dangers is said to lurk in the relative isolation of the man in command. "A man becomes more and more isolated as he goes up," Woodward points out. "His channels of communications, both up and down, get narrower, and he is bound to be more and more lonely in his work.

"In his insulated position, removed from the workaday problems of the lab and pilot plant, the research director is prone to develop a feeling of infallibility. This is likely to be especially true in very large companies where management rarely, if ever, learns of the difficulties encountered in carrying out plans and directives.

"A research director in such a situation may forget how the man at the bench feels, which means that he runs the risk of losing his good judgment

and the confidence of his staff."

What can be done? Woodward has this advice: keep your channels of information as clear as possible, and make an effort to broaden them, whenever possible. "But more important," he points out, "is that you and your men speak the same language. This is the problem of communications reduced to fundamentals, and it can be effectively attacked by the group-discussion method.

"In ordinary conversation, a speaker often fails to successfully convey his message to his listeners. That's chiefly because words are associated with feelings—and some words may carry a high emotional charge for the listener.

"The average person," Woodward explains, "filters words through his personal emotional sieve, retains only a portion of their intended meaning. What he hears may be considerably different from what you meant, and that can be the start of an exasperating and wasteful misunderstanding."

Discussion conferences of six or seven people under a trained leader are cited as a good way to minimize these contretemps, raise the general level of communication within the research organization.

Here are two examples of how such groups operate:

- An idea is stated to members who are asked, individually, to give it back in their own words. Differences in understanding, clearly revealed in this manner, are then "kicked around" in group discussion. An alert, lively group often is able to shed light on how these differences arise and how they can be reduced. One practical rule arrived at by this method is that simple words are least likely to be misunderstood; to make your point, say it simply.

- Another gambit is to have group members take pencil in hand and define words or answer simple questions (e.g., what qualities are needed by a good chemist?). Results of these schoolbook-sounding exercises are frequently highly illuminating, valuable in pinpointing different (and sometimes conflicting) viewpoints on a familiar subject.

Not all potential troubles are built into the job. A research director and for that matter, any businessman, brings his emotional problems to the

office, just as he takes them home and to the golf course.

"By his nature," Woodward maintains, "the good researcher is something of a perfectionist. He's accustomed to working with detail and he will take great pains to do a thorough job. Such an individual, when he assumes a supervisory post, may find it very difficult to delegate authority. He feels that no one can do a job as well as he and half the time he itches to get into the lab and do it himself.

"These feelings are perfectly normal and don't make him a bad boss," Woodward explains, "provided that they don't control his behavior. If they do, the consequences are apt to be costly. A meddler, who can't refrain from telling his staff how to do every little detail of their jobs, can be very hard on morale.

"In the more extreme case, such a problem-child may send one of his men on a field trip so that he may take over the latter's work, do it 'better.' Sometimes the department officer who does this sort of thing isn't aware of his motives; he may be convinced that his decision is based on wholly different reasons.

"The point is that how you feel in any given situation is not as important as how you act. It's what you do in dealing with people that determines whether or not you are a good executive."

Here again, the discussion group can render a service, says Woodward. By discussing his own experiences (and those of others in the group) in deal-

ing with people, the management man will begin to get some insight into the feelings that have a bearing on his performance as a leader.

Woodward also advises executives to take some time occasionally to evaluate the objectivity of past decisions. Freed from the emotions of the moment, a man stands a better chance of seeing a situation in its true light. If his actions don't stand the test of time, he will, at least, discover where he went wrong—and that's vital if he wants to guard against making the same mistakes again.

Despite his avowed faith in the conference technique, Woodward cautions against expecting it to work miracles. "Even under the best conditions," he emphasizes, "people are not predictable; what works with one fellow may not have any effect on the next."

By the best conditions, Woodward means a top-notch discussion leader, trained and experienced in the psychological techniques of group work. Very simply, the job of the discussion leader is (first and foremost) to maintain his own objectivity; ask questions that will steer the discussion into rewarding pathways; and keep the group from continually breaking into factions.

The prevailing spirit of the organization also bulks large, determines the type of conference that can be held and how freely participants will talk. To preclude an obvious source of vocal reticence, discussion groups usually comprise people on about the same level of authority.

Woodward feels that a firm's per-

Common Sense Can Pay Off

There is no rule-of-thumb system of getting results in the field of human relations. But here are three psychologically sound ideas that pay dividends for research executives.

(1) Never give a man a job without explaining the reasons for your decision. Telling him why shows that you respect him as a person.

(2) Encourage at least one person in the company to be completely honest with you, even though it may mean telling you things that are not always pleasant. Someone in personnel is usually the best candidate for this job.

(3) In writing, as well as speaking, keep your language simple and direct, by using short, familiar words. The simpler you say it, the better are its chances of being completely understood.

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RESEARCH

sonnel department should take the initiative in getting the conference technique started. In all cases, however, he cautions that professional aid is needed at the outset. This may be obtained at the school of business administration of any university.

Setting up a conference system admittedly requires time and effort. But in research, particularly, Woodward maintains, it can repay the investment many times over.

He explains: "It can instill the elements of good leadership in the young researcher, the fellow who is a little uncomfortable with people and thinks that he would like to spend the rest of his professional life at the bench. Unless he's the rare exception, he ultimately finds that it's painful watching his juniors get ahead while he remains a laboratory chemist.

"This man can't be ignored, or he becomes a serious focus of discontent. And in the overwhelming majority of cases, he either moves up or gets out.

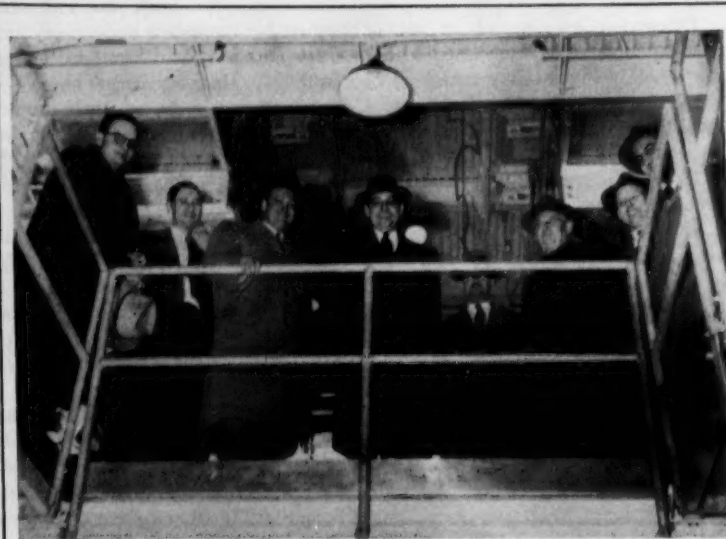
By receiving training in leadership, the normally shy researcher is prepared for administrative responsibilities.

"Such a man's value to his company increases a hundred-fold," opines Woodward. "The same holds true, in varying degrees, for everyone from project leader to vice-president. All, moreover, are likely to discover that getting the best from their people can be as satisfying as closing the book on a carefully conceived and neatly executed piece of research."

Oxidant Aspirant

Despite the host of oxidants commercially available, there's always room for a good new one. That's the idea behind the appearance this week of pilot-plant quantities of chromyl chloride, Mutual Chemical Co. of America's (Baltimore) entry aimed primarily at fine organics producers.

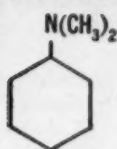
Mutual's hopes for its oxidant, which also doubles as a chlorinating agent,



Out for Engineering

A NEW PUSH for process research was signaled by the convening of Monsanto's research and development chiefs in Nitro, W. Va., the other week. Occasion: unveiling of the company's recently completed engineering research laboratory—a four-story, 60x85-ft. structure that

shelters studies pertaining to intermediates, oil additives, rubber and agricultural chemicals. Heading the high-level expedition: vice-presidents Carroll Hochwalt (*third from left*) and Charles Sommer, Jr. (*clasping rail*), general manager of the organic chemicals division.

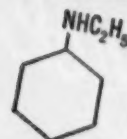


N,N-Dimethylaniline*

A colorless to light-yellow oil, soluble in most organic solvents—but practically insoluble in water. May contain as much as 0.25% N-methylaniline as impurity.

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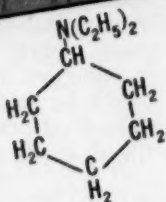


N-Ethylaniline*

A clear yellow-brown oil, infinitely soluble in alcohol and ether, practically insoluble in water. May contain up to 0.5% and 2.5% N,N-diethylaniline as impurities.

Specifications:

Purity: 97.0% minimum. Distillation range: Distills 5 to 95 cc. within 1.0°C., including temp. 205.0°C., corrected to 760 mm.

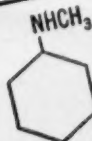


N,N-Diethylcyclohexylamine*

A clear, colorless liquid, soluble in ether and benzene. Slightly soluble in water. Traces of cyclohexanone and N-ethylcyclohexylamine may be present as impurities.

Specifications:

Purity: 98.5% minimum. Moisture Content: 0.1% maximum. Distillation Range: Distills 5 to 95 cc. within 2.0°C., including temp. 194.5°C., corrected to 760 mm.

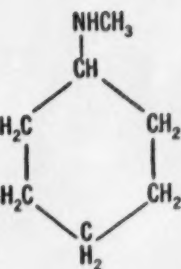


N-Methylaniline*

A colorless to light-amber oil, soluble in dilute hydrochloric acid. It contains up to 4.0% N,N-dimethylaniline and 1.0% aniline as impurities.

Specifications:

Purity: 95.0% minimum by total nitrite absorption, corrected for aniline and N,N-dimethylaniline content.



N-Methylcyclohexylamine*

is a strongly basic secondary amine, soluble in both alcohol and ether but only slightly soluble in water. It is a water-white liquid with a specific gravity of 0.86 at 20° C. Traces of cyclohexylamine and N,N-dimethylcyclohexylamine may be present.

SPECIFICATIONS: Purity: 99.0% minimum.

Methylaniline Content: 0.3% maximum.

Distillation Range: Distills 5 to 95 cc. within 2.0°C., including 149°C., corrected to 760 mm.

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RESEARCH

stem from the compound's physical properties—in particular its miscibility with organics (unique among chromium-containing oxidizers).

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Chromyl chloride's volatility suggests its use in vapor-phase oxidations, using carbon dioxide or nitrogen as an inert carrier for the vapor. There's also a chance of using it to produce new organic chromates from the more oxidation-resistant organics.

Also tied to chromyl chloride's compatibility with organic solvents is its

potential in the preparation of trivalent chromium-organic complexes, which have unusual waterproofing and oil-repelling properties.

Another chromyl chloride asset is its solvent action on chromic anhydride. The resulting solution is a vigorous oxidizing agent that is capable of igniting many organic materials.

Mutual sees no handling or storage problems with chromyl chloride, in spite of the compound's reactivity. The company's confidence is based on high purity, which minimizes the product's penchant for metals: the form now being sold contains over 98% chromyl chloride; chlorine and sulfur trioxide are the main impurities.

Fungicide Candidates

These new experimental antifungal agents bowed in this week.

• Tropical fungus-caused skin diseases are reportedly highly vulnerable to a *Penicillium*-derived antibiotic developed at Borkent Pharmacie (Haar-

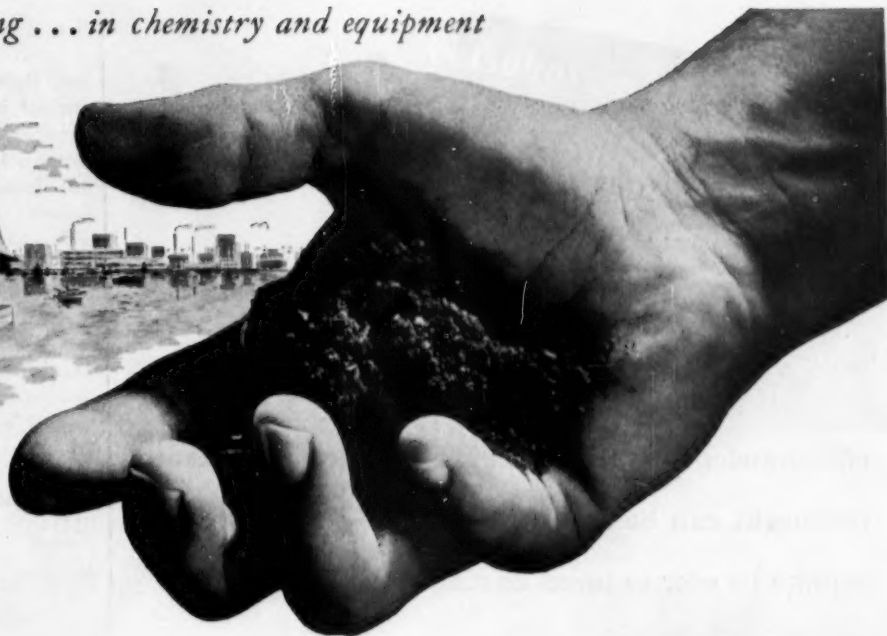
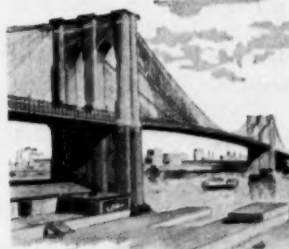


Cold Sterilization Closeup

PREPARING SAUSAGE meats for a high-voltage dose of electrons, is Swift & Co. researcher J. F. Kim. His audience: a fraction of the industrial, government and university scientists who assembled in Chicago last fortnight to hear of radiation-

sterilization research progress from staffers of the Quartermaster Food and Container Institute. A Defense Dept. agency, the institute is pioneering chemical and microbiological studies related to radiation sterilization of foods and drugs.

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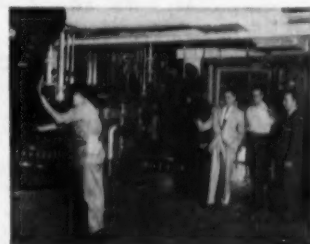
This glassed steel equipment is producing Terramycin® and Tetracycline*, Pfizer-discovered antibiotics; crystalline Vitamin A, and Bonamine*, a Pfizer specialty for motion sickness.

If you are in the chemical processing business—whether producing pharmaceuticals or farm supplies, petroleum or playthings—Pfaudler glassed steel or alloy equipment may be able to save dollars on your daily costs, and add to product purity. Write for general information Bulletin 902.

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THE PFIZER PRODUCTION TEAM in a round table discussion on the proposed installation of Pfaudler glassed steel reaction equipment. They are (l. to r.): D. C. McClain, special consultant and former Director of Engineering; G. F. Dappert, Project Engineer; A. J. Greene, General Production Manager; E. F. Harger, Design Engineer; G. Kuhnia, Pfaudler representative; and J. Capo, Design Engineer.



G. Dappert, Project Engineer, turning over the completed installation of Pfaudler glassed steel reaction equipment to T. G. Drustup, Head of General Organic Department, and W. L. Elwood, Jr., Plant Superintendent, at the multi-million-dollar, 60-acre Groton, Connecticut plant.



PFAUDLER glassed steel reactors have basic application in chemical plants the world over because of high resistance to acid and alkaline solutions.

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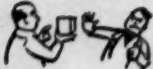


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

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RESEARCH

lem, Holland). Named antimycin, the product is claimed to be particularly effective against athlete's foot. The material is crystalline; has the empirical formula, $C_{21}H_{22}O_8$, a melting point of 167 C, molecular weight of 402; and is said to be heat resistant and stable in acid and mildly alkaline solutions. Drawback: low water solubility.

• Research by the U.S. Dept. of Agriculture (Orlando, Fla.) indicates that pyrrolidine is better than commercial 2-aminopyridine for preventing green mould in Florida oranges, but not as good in staving off stem- and rot. A mixture of the two, reports USDA, has an edge over either.

Synthetic Lifeline

In a Birmingham, Ala., hospital, last week, a "miracle" fiber came pretty close to justifying that optimistic appellation.

Nylon, woven into a crimped tube, was successfully replacing a section of leg artery in a middle aged man who previously was faced with loss of the limb. Behind the achievement are Chemstrand Corp. researchers, headed by James Tapp, who became involved after learning of Chemstrand engineer Pat Moore's efforts to machine-produce such "spare parts" from nylon and Acrilan.

Moore, himself afflicted with a circulatory disorder, never lived to see the outcome of his work. But Chemstrand is seeking surgical supply houses to manufacture the synthetic lifelines on a royalty-free basis.



CHEMSTRAND'S TAPP: In hand, a hard-won "spare part."



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GUIDEPOSTS FOR SALES PRESTIGE SURVEY:

- Most sales managers blame technological schools for lack of prestige associated with selling job.
- There are steps companies either have taken or can take to avoid or remove sales stigma now commonly in the minds of technical college graduates.
- By way of in-company training approaches, prestige for sales work has been increased subtly but substantially.
- Future outlook: economic forces now at work will push salesmen into limelight, impart increasing prestige to their position.

Matter of Pride: Sales Managers Speak

Right now, out on the West Coast, a district manager of one chemical company is looking for a young man to add to his sales staff. In fact, he's been searching for some time for the right man—without success. What makes this manager's hunt so discouraging is that although the job requirements are only moderately high, the company is favorably regarded and the position offers a substantial future, no qualified person has applied for the job.

Wherein lies the difficulty? Why no applicant? The disconsolate manager's bitter conclusion: to attract a bright, young, technically educated college graduate into sales work, a company must dangle one additional lure—job prestige.

To determine how universal is this need to "build up" job prestige for selling, how acute is industry's difficulty in recruiting sales personnel, CW has polled some top sales managers throughout the country.

Some conclusions, generally (but not universally) held:

- Sales job prestige, high in the eyes of most managements, ranks low in the opinion of college professors and pure researchers.
- Prestige varies with company size, reputation and the effort made by home office to enhance salesmen's reputations.
- While some companies have taken definite action to increase salesmen's prestige, many steps remain largely untried.

- As a result of a shift from order-taking to an economy demanding sales development, the status of the salesman has been improving and will continue to rise.

Education Emphasis: Rightly or wrongly, sales managers lay much of their trouble in recruiting suitable sales personnel at the doors of the colleges.

In pointing their fingers at the educational institutions, the industry men accuse the professors of:

- Tailoring courses for the particular needs of researchers, leaving little or no curriculum leeway for studies of possible benefit for technical sales.
- Consciously or unconsciously counseling seniors to consider sales jobs only as last resort, to be thought of only after (usually in this order) graduate work, pure research in institutes or government bureaus, applied research, process development, or product development.

Despite their criticisms, practically no sales manager would make drastic changes in school curricula. Although a scattered minority suggest adding courses in selling, the majority disagree—deem it "too trade-schoolish."

But industry men believe that the schools can, and without lowering academic standards, be of greater assistance to industry. Some suggestions:

- "Recognize that a healthy economy can continue only if our natural resources are converted into materials to be sold . . . appreciate marketing

problems of the future and the need for trained personnel to solve them."

- "Provide more seminar work during senior year concerning industrial job possibilities."

- "Provide more of a humanities background." At least one technology school is already insisting upon a broader undergraduate base. More, say the sales managers, should follow suit.

Ironically, in preparing potential sales recruits, as far as the chemical makers are concerned, the wrong schools are doing the right job. Nub of the cross-purpose: most sales-minded graduates are from business administration schools; in contrast, most manufacturers prefer molding salesmen from chemistry major raw material. As one manager expresses it, "Give me a young guy with technical savvy and personality, and let me train him—anytime."

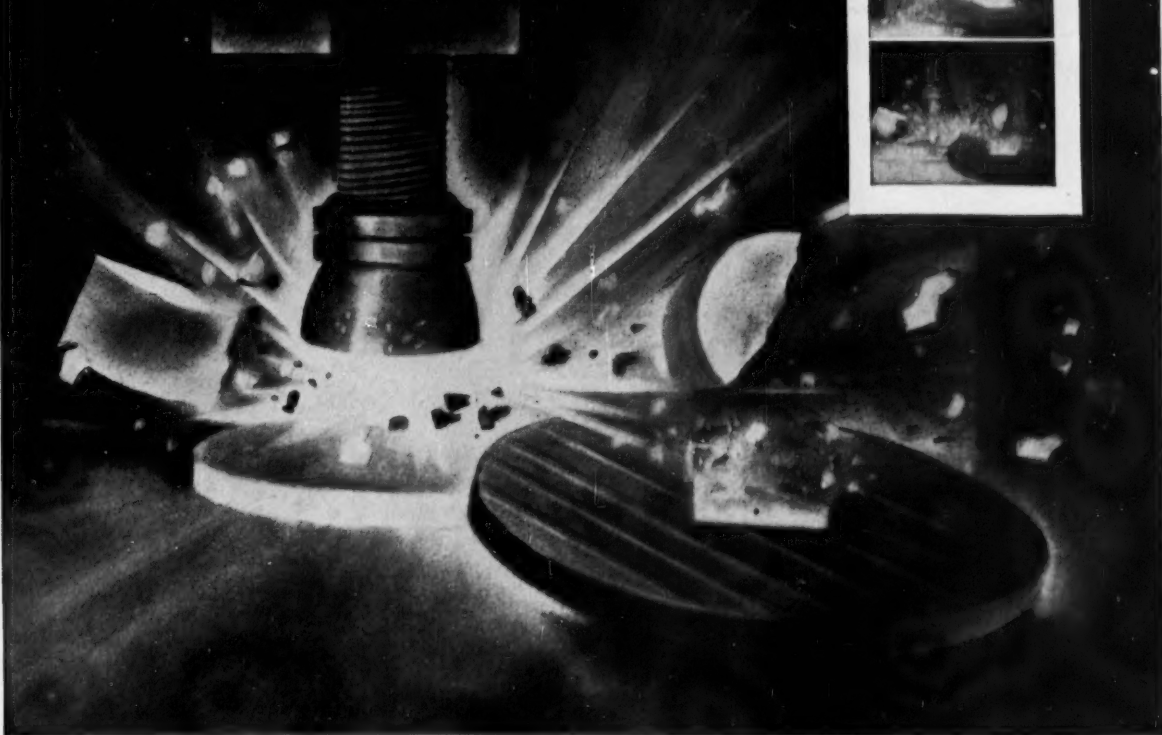
Industrial Onus: But business men recognize that much of the burden of "selling" sales work to college recruits rests squarely at home. One division manager phrased the relationship of industry to education this way:

"Perhaps we in the chemical industry have failed somewhat in not going to the colleges and universities to show the professors what industrial selling really is.

"Perhaps it's a problem of educating the educators, not so much to give them a better appreciation of the value of chemical salesmen, but a

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better idea of what the chemical salesman actually does and how undergraduate students could be better trained for sales jobs."

On the other hand, no industry man advises that business should attempt any direct campaign to change educational curricula. Consensus: "It's a problem for the schools."

Beyond establishing rapport with the educators, some manufacturers have found other status-raising steps of value. Some of these:

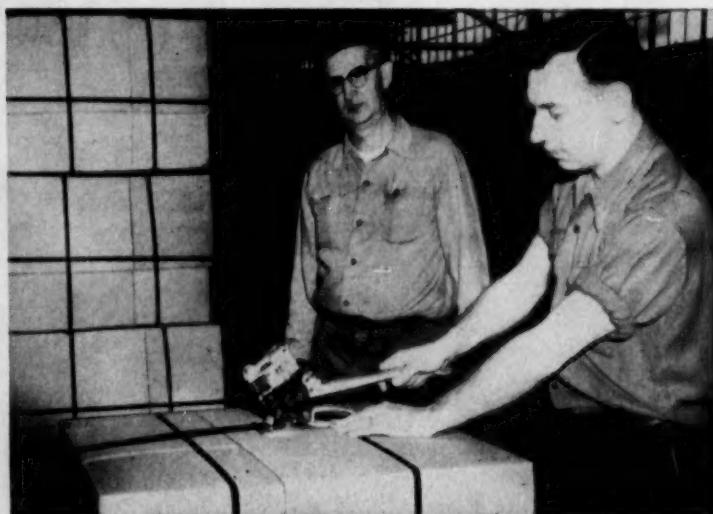
- Sponsoring visits of successful salesmen to their alma maters. Salesmen, over the managers, should be encouraged to talk for their company (and for the career of selling) to undergrads and their professors. Aim: to prove to students that technical sales carries as much prestige as research.

- Send sales management representatives along with employment re-

cruiters. Furthermore, arrange talks by sales managers before student bodies. One leading company has found this approach strikingly successful in providing it with a pool of sales applicants from which to select.

- More participation by sales people in technical organizations. They should be encouraged to be active on policy-making committees, thereby still further broaden chemical society aims from purely "technical" to "professional" with more emphasis on marketing.

Over the Hump: Admitting a considerable degree of failure in establishing prestige for sales in the eyes of the college recruits, some companies are using a delayed attack upon the problem. They hire ostensibly for non-sales positions, e.g., laboratory or production work, meanwhile keeping a lookout for future sales potential.



Telescoping Snugs Odd Sizes

SIMPLIFIED and economical packaging for combinations of odd package sizes is the claim producer Signode Steel Strapping Co. makes for this adjustable fiberboard container.

The container, dubbed Adjusta-Pak, is formed from eight separate corner pieces. Four bottom sections are positioned to form an open box. When it's filled, top corners are telescoped over the bottom sections and

adjusted to the size of the contents. Steel strapping is next applied to bind the unit together.

Corners are assembled by the user from flat, slotted and scored fiberboard sheets. The erected box can be varied in cube from 18x18x7 in. to 38x28x24 in. Reduced waste volume and the concomitant need of inner packing is the chief advantage claimed for the new pack by the manufacturer.



Dependable Source for Chemical Raw Materials



W. A. Kirkpatrick (left), Vice President and Technical Director of Allied Paper Mills, Kalamazoo, Mich., inspects automotive catalog printed on a new Allied stock with Robert W. Hagemeyer, Wyandotte representative, and Clinton J. Wainwright, Allied Sales Representative (right).

“We look to Wyandotte for current needs, and help on future developments”

— W. A. Kirkpatrick, Allied Paper Mills

“We specialize in the manufacture of fine printing papers for both letterpress and offset,” states W. A. Kirkpatrick, Vice President and Technical Director, Allied Paper Mills, Kalamazoo, Michigan.

“Due to our hard-water supply and our re-use of wash waters, it is almost mandatory that we use sodium hypochlorites for bleach. Previous experience with calcium hypochlorite showed us that it lined-up in our tanks and washing equipment . . . we don't have this trouble with sodium hypochlorite, and we also feel that we get a cleaner, better color. Wyandotte worked closely with us in making this change.

“We use Wyandotte Caustic Soda

for cooking old paper stock and de-inking. Wyandotte representatives and their research organization have been very helpful to us in our regular production, as well as on special projects. For example, Wyandotte helped us greatly in the development of our new three-stage bleaching operation (one of the most complete and finest in the industry). This development enables us to get fibers from waste paper fully equal—and in some respects, superior—to virgin pulp.”

How about your business? Wouldn't you be better off with a supplier of chemical raw materials, large enough to take care of your requirements even in periods of short supply, yet interested enough in

your current needs and future progress to be always available for technical assistance? Write Wyandotte now, *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*



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Usually it's just a question of time, as one manager says, before the new man "realizes a salesman is a decent fellow. Then some of them come around and ask to join the sales force."

For the small company, this indirect approach is, of course, seldom practical; it simply can't afford to wait for the inside man to decide that selling not only pays well but also carries a substantial degree of prestige.

But even the larger organizations are using devices to accelerate the prestige-building impression upon their recruits. Two common methods now being pushed:

- Aware that within the company sales prestige is probably lowest among the researchers, some managements are encouraging more team work between laboratory and field men. Reasoning: the lab man, in a position to observe to what extent the fruits of his efforts depend upon the skill of the salesman, is more likely to credit the other with those skills. Now especially, with most products in plentiful supply, the research man, with the heat on him to provide new profit-making products, is more likely than ever to appreciate the salesman's cooperation in getting the new items rolling.

- Another sales buildup tactic—perhaps the best method, if the company can afford it: send a technical man, as such, out with the regular salesman. For although the technical man may never actually ask for the order, many sales are often consummated through his sales development efforts.

A third route by which at least one leading company establishes the importance of sales in the minds of its recruits: postgraduate night courses and lectures on company operations and selling policies—a two-year in-company training program before going "on the road." Usually, by the end of the second year, most men are "rarin' to go," all doubts as to sales prestige removed.

Order Takers No Longer: Once over the hump of the indoctrination period, most salesmen, their bosses contend, seldom give the question of job prestige another thought.

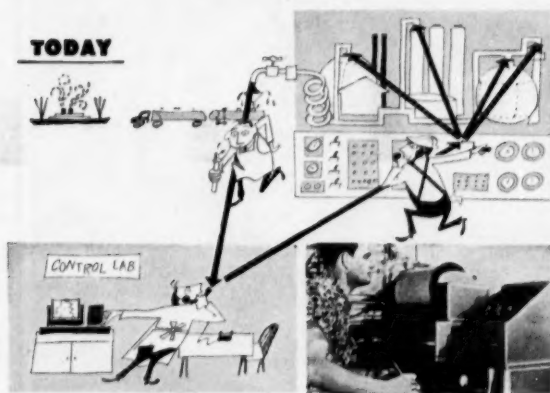
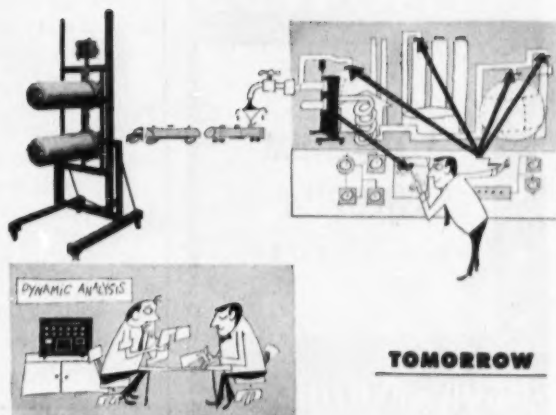
On the contrary, in sections of the country where production and research are not time-honored dominating factors, technical sales work is

Analysis Moves from Lab to Line

The pride of the automation proponents is the chemical processing plant. Carloads of materials flow through its complex network of pipes into gleaming fractionation columns, purification towers and reactors with a minimum of human attention. Equally large amounts of finished product flow outward without ever having been seen by human eyes.

This complex system functions smoothly thanks to the hundreds of control instruments in any processing plant. They control material flow, they provide the correct temperature and pressure to produce the highest product yield. These plants represent our closest approach to the automatic factory.

But in this system there are flaws. For even when all dials and gages are functioning correctly, the product yield in terms of quality and quantity may be completely awry. These instruments will not indicate changes in raw material composition, catalyst contamination, or loss of efficiency in a scrubbing tower. Present-day instruments indicate only the process stream environment, not the composition of the process itself. Only the control labora-



tory is able to give us an accurate picture of the product and its composition as it moves through the plant. Subtle deviations in the product can be spotted and analyzed, and from the control laboratory instructions can be forwarded to process areas prescribing changes in control instrument settings. Thus, true control in today's processing begins in the analytical laboratory.

But efficient as they are, control laboratories still represent a bottleneck in the processing chain. It takes time to move a sample to the laboratory, analyze it, and relay findings back to the plant. Meanwhile, vast quantities of

product may have moved through the processing units.

An obvious solution is to move the laboratory to the problem, i.e., tie an analytical instrument like the infrared spectrometer directly into the process stream where it can produce continuous and instantaneous data. Instruments capable of providing such "on-stream analytical control" are just beginning to appear. They will not replace existing environmental controllers but they do provide the means for automatically controlling these instruments to meet changing process stream conditions. They close the loop between the product and the process stream environment in which it is produced.

Two such on-stream analyzers are already in production by Perkin-Elmer and are being used in the field. Known as the Bichromator and Tri-Non Analyzers, each has its use depending upon the particular problem to be solved. While the most obvious application for such analyzers is to monitor the finished product, in a complicated chemical process where there are many variables, end point analysis does not provide sufficient control information. Hence, it is found advisable to install instruments at several critical points in the process. Such analyzers will soon make true automation a reality in chemical processing.

Digest of an article from *Control Engineering*, Oct., 1954.
Reprints available from Perkin-Elmer on request.

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often more highly regarded than either. One Southern sales manager describes the local situation this way:

"In my opinion, the position of technical chemical salesman is more desirable [than nonsales work]. Our outfit has more trouble getting production chemists or engineers. Besides being the best income opportunity, selling, we find, stands up well on a basis of social preference, prestige, or status.

Looking ahead, most sales managers envision an evolutionary upgrading of sales importance (and consequently prestige).

Viewed in terms of our past and future economy, one manager says:

"For the past 10 to 15 years, while practically all nonsales talents—e.g., research, production, financial, legal—were being called upon, salesmen were seldom required to demonstrate their ability.

"Now, with the switch to abundance of output and stepped-up competition, high-caliber salesmen, put to the test, will almost automatically raise the prestige of their jobs—even in the eyes of the schoolmen and the raw recruits, who now seem to be the chief doubters."

For Your Reference: Nitric acid hazard control—20-p. booklet discusses the hazardous properties of nitric acid and nitrogen oxides. Handling, labeling, storage, personal safety and protective equipment, and industrial processes containing a risk of exposure are included. Catalog No. L 16.25:11, Government Printing Office, Washington 25, D.C.

• Cooperative trade association—brochure containing information about the sales prospecting and technical services offered by a group of southern California industries to manufac-



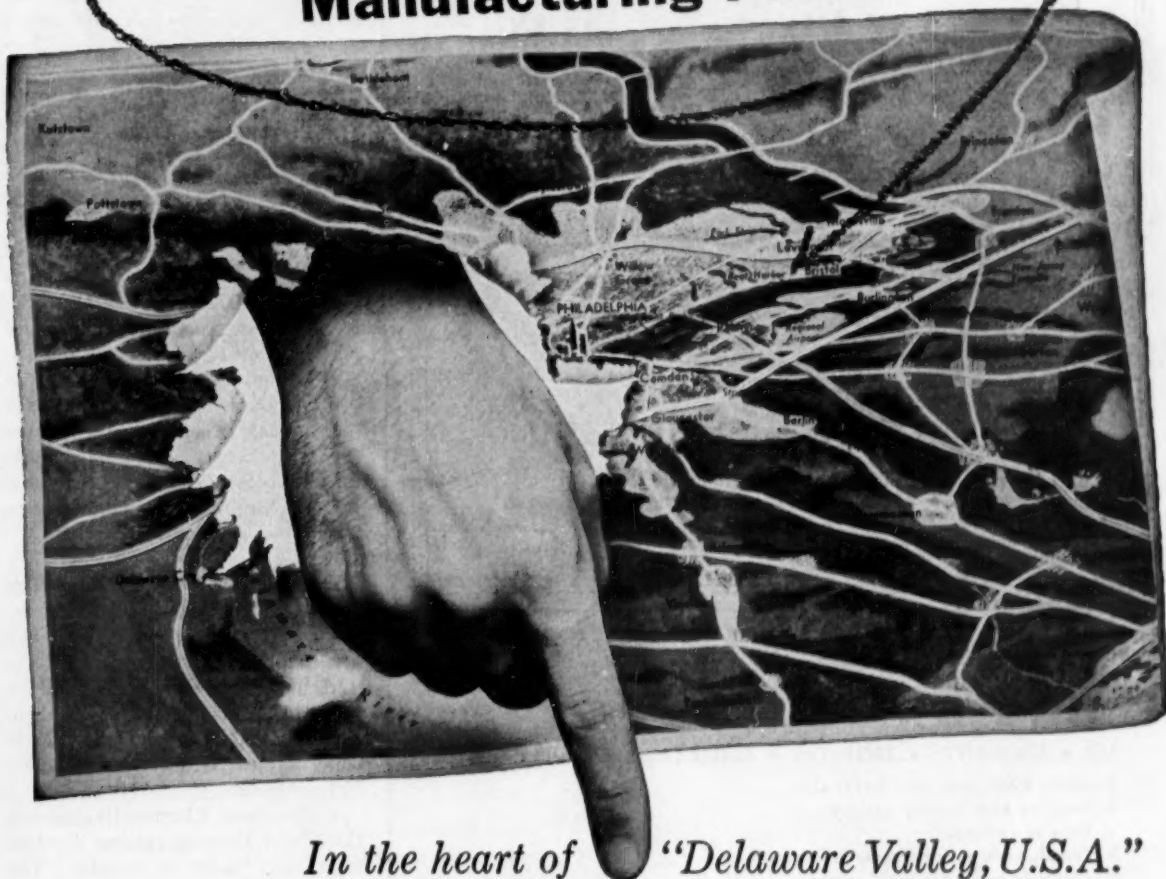
Aluminum Sulfate Rides West

BRIMMED with aluminum sulfate liquor, this rubber-lined tank truck heads out from Consolidated Chemical's new Houston, Tex. plant, (CW Newsletter, Jan. 15) bound for the firm's Southwestern customers. It's the first such shipment.

Complementing two other alu-

minum sulfate factories (both in Louisiana), the Texas reactors manufacture the paper chemical from materials produced by CC-owned sulfuric acid (Houston) and bauxite mining (Arkansas) operations. Spent sulfuric acid will be reclaimed in a new sludge acid plant opening at Houston in April.

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turers of extruded rubber and molded plastic parts, electronic parts, and metalworking. Industrial Manufacturing Services Corp., Los Angeles.

• Molders' directory—alphabetical listings of custom and proprietary polystyrene molders in the U.S. and Canada. Services of each molder are also briefly described. Koppers Company, Inc., Pittsburgh.

• Plasticizers — booklet providing specifications, physical chemical data, and suggested uses for various phthalic, sebacic, and adipic acid esters. Hatco Chemical Co., Fords, N.J.

• Price schedule — tabulation of Eastern prices for various bulk solvents, amines, and riboflavin. Information on new federal regulations for ethyl acetate are included. Commercial Solvents Corp, New York.

• Standards approved in 1954—list of standards authorized by the American Standards Assn. (New York) for the construction, electrical, mechanical, and photographic industries. Some involve chemical materials.

Screenings: Control of Dutch elm disease and elm phloem necrosis by chemical methods is considered in two new films offered by Standard Oil Co. (Indiana). In color, the films show the use of DDT-white oil sprays. Michigan State College and the Illinois State Natural History Survey aided film production.

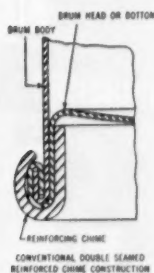
• Cleveland Electric Illuminating Co. is now showing an area development film, "Land of Promise." The movie, according to company officials, is the first motion picture effort to pictorialize the expected effect of the St. Lawrence Seaway on the Great Lakes region. In color and 20 minutes long, the film surveys the current industrial and port status of the northeast Ohio area and portrays various detailed economic data of significance to the area.

Packaging Progress: A new packing process has upped the uncompressed powdered carbon black capacity for freight cars some 30%. Witco Chemical and Continental Carbon (New York) are now shipping 65,000 lbs. (in bags) per car instead of the previous 50,000-lb. quantity. The trick: use of a filling nozzle as large as the entire mouth of the bag. This eliminates waste space occupied by trapped air.

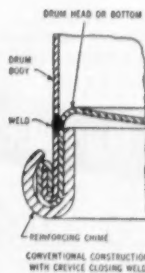
Here are important features that mean big savings with USS Stainless Steel Drums and Pails



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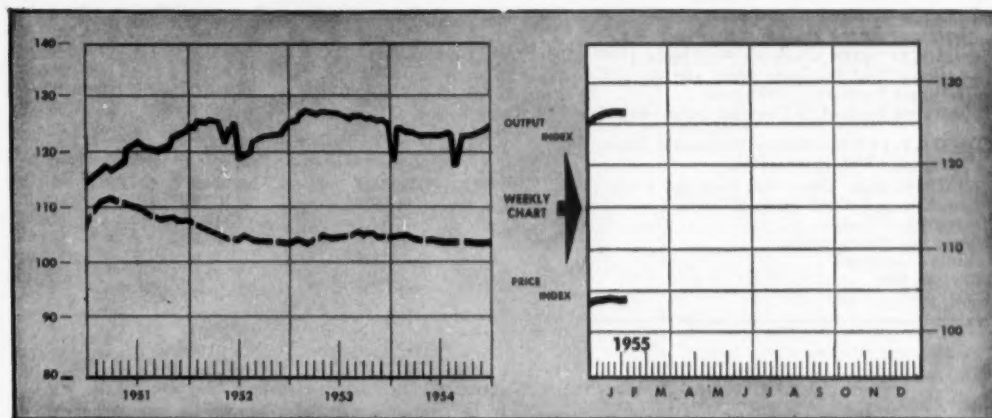
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MARKETS



CW Index of Chemical Output—Basis: Total Man Hours Worked in Selected Chemical Industries
CW Price Index—Basis: Weekly Prices of Sixteen Selected Chemicals

MARKET LETTER

Formaldehyde prices at the moment appear fairly steady—a condition noticeable since late December's cut brought Eastern tank tags down to \$3/cwt. (*CW Market Letter*, Jan. 1). It's not too difficult, however, to ferret out prognosticators of a change brewing; and further, the hike may well be included in second-quarter quotes. Opinion is that current levels are much too low to match production and handling costs.

Formaldehyde business has been brisk of late, with demand—especially from synthetic resins and adhesive outlets—expected to hold up well for some time. And there's no concern yet that output rate is inadequate to satisfy all calls—either now or then.

Shaved thin, too, are profit margins on the big-volume phthalate plasticizers. So close are selling price and manufacturing costs that most major producers ridicule the possibility of any near-future reductions.

Take dioctyl phthalate (DOP) and diisooctyl phthalate (DIOP), for example. With the larger sellers reportedly moving all of their turnout at the 30½¢/lb. (tanks) price set last fall—ostensibly to buck under-the-counter prices—the few instances of slight price concessions by smaller sellers are of no consequence to the general market.

Also in the plastic materials arena: last week's slash in Rohm & Haas's acrylate monomer prices (both ethyl and methyl) evoked a parallel move from Carbide and Carbon on ethyl acrylate.

The cuts, amounting to 4¢/lb. (by both firms) on the ethyl and 1¢/lb. on the R&H methyl monomer, establish new tank-car prices of 38¾¢ for the former, 41¾¢ for the latter.

The move, insists R&H, emphasizes the firm's resolve to "maintain our leading position in the acrylic field and to reduce costs in order to enter new markets."

Significantly, Carbide—apparently shelving its methyl acrylate plans (*CW Market Letter*, July 10, '54)—made its commercial bid for ethyl acrylate customers just a week or two earlier, announcing that the material is "now available in tonnage quantities" from its Institute, W. Va., installation.

MARKET LETTER

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
CHEMICAL WEEK Output Index (1947=100)	126.9	126.6	123.5
CHEMICAL WEEK Wholesale Price Index (1947=100)	104.4	104.4	105.0
Bituminous Coal Production (daily average, 1000 tons)	1,450.0	1,473.0	1,306.0
Steel Ingot Production (1000 tons)	2,129.0 (est.)	2,110.0 (act.)	1,779.0
Stock Price Index of 13 Chemical Companies (Standard & Poor's Corp.)	376.4	368.1	369.9

MONTHLY INDICATORS—Wholesale Prices (Index 1947-1949=100)

	Latest Month	Preceding Month	Year Ago
All Commodities (Other than Farm and Foods)	115.3	114.9	114.6
Chemicals and Allied Products	107.1	107.0	107.2
Industrial Chemicals	117.3	117.4	118.4
Drugs and Pharmaceuticals	93.6	93.6	93.9
Fertilizer Materials	113.7	113.3	114.0
Oils and Fats	61.4	59.3	61.2

Activities in Washington, too, attract the attention of chemical buyers and sellers. BDSA's Chemical & Rubber Division has set up for next Thursday a meeting with makers of pyrethrin extracts and importers of pyrethrin flowers. Reason: to discuss ways that the government can dispose of some U.S.-held surplus extracts.

The oversupply (in excess of mobilization needs) turned up following a recent review of requirements for the government's stock pile of strategic materials. Aim of the agency is to sell the pyrethrin extracts but not disrupt the market. Exact amount involved is hidden under a security cloak, but indications are that the quantity is "substantial" when compared with the 400,000 lbs. of 20% extract used in a normal year.

BDSA's latest issue of its Chemical and Rubber Industry Report is loaded with predictions on commodity production for '55. If the crystal gazers are correct, the current 12-month period bids fair to rack up some impressive records.

Note these estimates: elemental sulfur—a record output level of some 6 million long tons; sulfuric acid—a peak year ahead with about 14 million short tons of production; chlorine—a 10% advance over last year.

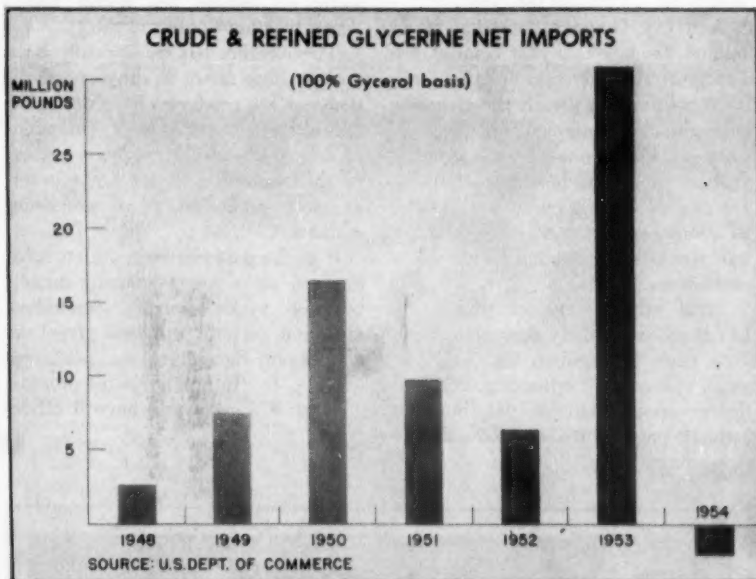
Heavy demand, as well as some increase in capacity, is expected for phosphorus and phosphatic chemicals; and argon calls may jump 10%. Antibiotic output this year will probably step up a like percent. For fertilizers in general, the agency expects '54-'55 to top the previous 12 months, and foresees a record peak in movements this spring.

General Services Administration has just revealed how the \$4-5 million DDT export pie was sliced (*CW Market Letter*, Jan. 15; Jan. 29). Among the top awardees: John Powell Division, Olin Mathieson, 4,060,000 lbs.; Diamond Alkali, 3,350,000 lbs.; Michigan Chemical, 2,700,000 lbs. Bids tendered generally quoted 25.85¢/lb.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending February 14, 1955

UP					
	Change	New Price		Change	New Price
Copper cyanide, tech., bbls., (20,000-lb. lots or more)	\$.048	\$.657	Red copper oxide, USN Type 1, 97%, bbls., wks.	.155	.64
Black copper oxide, bbls., wks.	.03	.42	Tung oil, tanks, NY	.0025	.2325
DOWN					
Ethyl acrylate, drms., c.l., t.l., dlvd.	.04	.405	Methyl acrylate, drms., c.l., t.l., dlvd.	.01	.435

All prices per pound unless quantity is stated.



AN IMPORT FLIP-FLOP last year; this year's market holds . . .

No Truce in Sight

Two events—one recent, the other yet to happen—plus some blustery seasonal weather over much of the U.S. of late—combine to turn the market spotlight on three top polyols—glycerine, sorbitol, and ethylene glycol. On March 17, sorbitol will be upstage when the Commercial Chemical Development Assn. makes its sixth annual award. Recipient this year—for his work in pushing the hexahydric alcohol and its derivatives from by-product to first-line rank—is Atlas's Vice-President and Board Member Kenneth Brown (*see cut*). The presentation will climax CCDA's all-day "Public Relations in New Product Development" meeting at New York's Statler Hotel.

Late last month, at another New York hotel, the Waldorf-Astoria, glycerine-keen producers, consumers, refiners and others listened intently while the old-line polyhydric's past, present and future was outlined by experts. The occasion: the 28th annual convention of the Association of Soap & Glycerine Producers. Of particular import to market followers was the discourse, by the association's glycerine manager Scott Pattison, on the "changing times for glycerine."

Coincidentally, sorbitol popped up in Pattison's talk. In pointing out that

glycerine consumers should have few supply worries in the future, Pattison noted that a further 10% decline in soap production could bring natural glycerine output down to 130 million lbs./year; but adding a potential 110 million lbs./year of synthetic will still boost U.S. glycerine production above the record 223 million lbs. set in 1950. "This makes no allowance, moreover," he added, "for production of glycerine from corn syrup via sorbitol, which has been publicly suggested as a future move by Atlas Powder."

Actually, Atlas's glycerine venture is still inchoate, will depend on continuing pilot-plant work and the important matter of economics. Few believe the process would payoff profitably unless glycerine prices were to zoom far above its current 30-31¢/lb. level.

The matter of price—of crude glycerine, and subsequently, the refined material—has often been a source of concern to consumers, producers and refiners. Fluctuation of production rates and of stocks on hand have many times been the chief reasons behind tag changes (*CW*, Jan. 30, '54, p. 73).

But 1954 was different. Although stocks rose as high as 64 million lbs. and later fell below 50 million—a percentage change in stocks that in the past would have altered glycerine

prices—another factor, competition, stepped into the picture, applied a steadying price clamp.

From mid-February on, Pattison pointed out, refined and synthetic glycerine were held at a price level calculated solely to maintain volume in competition with other polyols. This applied particularly to the alkylid resin market, where the price range at which glycerine substitution takes place is quite clear-cut.

At any rate, the competitive ceiling proved too low for other than synthetic glycerine. Domestic refiners of imported and other purchased crude were faced with an inadequate differential (about 10 or 11¢/lb.) for the cost of refining. At least one major East Coast refinery was closed as a result.

Most striking effect of the profitless refining squeeze was the complete reversal of the import-export trend in '54, as compared with the previous year (*see chart*). From a net import balance of 31 million lbs. in '53, last year finished out with a net export balance of 2-3 million lbs.

Chances are slim that the import-export bar will soon whip as high or as low as it did during the last couple of years. Reason: projected expansion of U.S. synthetic glycerine output will contribute greatly to the underpinning of future glycerine availability. Shell Chemical, for instance, now able to turn out close to 60 million lbs./year, will in the spring, come in with an



FARLAN BACHRACH

ATLAS'S KENNETH BROWN: An award for sorbitol enterprise.

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MARKETS

additional 25 million lbs./year.

Add too, Dow's expectation of 25 million lbs. late this year from a new Freeport, Tex., glycerine plant.

No matter how greatly the glycerine productive facilities should expand, however, there's one consuming outlet that has long since been lost—the anti-freeze market. Top polyol in the field, of course, is ethylene glycol; perhaps half the U.S. production winds up in antifreezes.

Total ethylene glycol production has been on a steady downslide since '52's peak 761 million lbs., and last year shows no upturning. Official figures aren't available yet, but one estimate pegs '54 at about 600 million—

some 30 million lbs. under 1953's warm weather-depressed rate.

The weather has traditionally been a controlling factor in ethylene glycol demand, but producers have been aiming at glycerine-like uses (in cellophane, synthetic fibers, detergents, explosives, adhesives, resins, and others), as more profitable, more promising markets (CW, Aug. 7, '54, p. 78).

If in the past just such outlets have inspired some rough sparring among bucking major polyols (including glycerine, sorbitol, ethylene glycol, as well as propylene glycol and pentaerythritol), the future holds no promise of a truce. Few would have it otherwise.



Man-Made Fiber Flair

YOU WON'T FIND cancan skirt slips or petticoats listed on any polyvinylidene chloride end use pattern, but just such an unexpected saran outlet has Dow Chemical understandably excited. The fad—of whipping the artificial fiber window screening into a new form and

new use with flared skirts—is currently sweeping Texas, may well spread if stylists and fashion experts latch onto the idea.

Significantly, Dow recently announced a new formulation of saran resin for monofilaments to be used in the weaving of saran fabrics.



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The Button You Push

170-175 million unit., valued at \$8-9 million*—that's the record aerosol valve makers are plugging for in '55.

Better materials of construction, more universal valve designs, additional types of containers, and production mechanization techniques are aims and needs that should hike valve use even more in the future.

The blistering pace of the aerosol industry has meant more than brilliant proof of a successful idea. It has provided a major outlet for chemical specialties formulations, built an important market for containers, and created a booming industry to supply the third vital component of aerosols, the dispensing valves. Today, glance

For chemical specialty aerosols alone. According to a survey by the Chemical Specialties Manufacturers Assn., 1953 valve production was about 146 million units. Add 50 million units (\$2½ million) to market including food products.

at that promising business shows:

- A roughly competitive industry with some 25 makers scrambling for a market estimated to be worth \$8-9 million yearly (for 170-175 million valves).
- A field where concentrated research, greater production mechanization, and sales rivalry have forced a drop in the price of the average unit from 9¢ in '52 to 5¢ in '55.
- A business where one manufacturer's need for the minute, plastic

valve parts keeps a battery of 20 injection molding machines running 24 hours a day.

Reciprocal Success: It's safe to say that the success of any new aerosol product has depended on development of effective dispensing valves. From the introduction of such "true" aerosol items as insecticide bombs and room deodorants, to such recent sales phenomena as shave foams and hair lacquers valves have performed an essential role.

And conversely, the public acceptance of these products has "made" some valve makers. The low-pressure, beer-can insecticide, for example, required Continental Can Co. to design a valve, which is now a standard manufacture of Seaquist Mfg. Corp. (Cary, Ill.).

Rise, one of the first pressure-packed shave creams, was dispensed through a specially designed valve—now a staple at Oil Equipment Laboratories (Elizabeth, N. J.).

In the food field, the success of products like Dairy Whipt created a big demand for the valves of Clayton Corp. (St. Louis) and Aerated Container Corp. (Chicago).

Heap Toppers: On top of the heap of valve makers, however, are those firms whose products aren't tied to any one item. Far and away the largest producer of aerosol valves is Precision Valve Corp. (Yonkers, N. Y.), which admits to turning out a greater volume than the rest of the makers combined. It is known to have poured out as many as a half-million valves per day over a period of several weeks.

Thought to be among the other top producers are Aerosol Research Co. (Forest Park, Ill.), Valve Corporation of America (Bridgeport, Conn.), Seaquist, Dill Mfg. Co. (Cleveland), and A. Schrader's Sons (Division of Scoville Mfg. Co., Brooklyn). Their precise positions, volume-wise, are hard to determine, since it is a field where competition seals lips. Also, firms like Bridgeport Brass Co. and Sprayon have "captive" valve production, which makes their capacity difficult to pinpoint.

Price Adaptability: It has become plain that firms able to offer readily adaptable, effective valves at the lowest cost are getting the most business.

Risdon Mfg. Co. (Naugatuck, Conn.) for example, has long plugged its JBR valve, a highly regarded unit made of expensive materials—and nearly priced itself out of the market. At \$80/1000, JBR loses out to products in the \$50/1000 range (products that Risdon has since added to its line).

Another firm handicapped by a "Cadillac" valve is the Engstrum Aerosol Valve Mfg. Corp. (Arlington, Va.), Engstrum, regarded as somewhat of a maverick in the field, has a precision-machined unit that can probably handle as wide a range of difficult-to-dispense products as any valve yet designed. Engstrum, however, refuses to compromise on manufacture, can't touch the prices of competitors.

Precision Plus: So far, products like paints, lacquers, powders and adhesives have proved among the most difficult to dispense. Valves for these products are generally more expensive than, and require certain modification of, conventional insecticide units. Great care and precision are practiced in the manufacture of all types of valves, however.

On top-quality metal insecticide valves, for example, tolerances on functional parts (like expansion and spray orifices) in some cases are $\pm .0005$ in.; on nonfunctional dimensions, $\pm .005$ in. In plastic units, tolerances of $\pm .002$ -.001 in. are common.

Quality control over components and their assembly is essential. Valve makers test the finished units for operation and leakage by hand (see cut, p. 86) or automatically (as is currently done at Precision).

Plastic-Dependent: Most top-selling valves nowadays are made largely of plastic. Polyethylene, cellulose acetate, nylon, are among the most widely used; Teflon, synthetic rubbers also get a big play. The plastics are particularly important for valves used with alcohol- and water-containing formulations, where such construction eliminates corrosion.

Some metals are widely employed, often in combination with plastic. Brass is perhaps as common as any one metal—aluminum, nickel-plated brass and steel are frequently used, too. Tin-plated steel is generally



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SPECIALTIES

found on parts like the adapter cups (to attach the valves to the one-inch opening found on many cans).

Although valve makers now are obviously getting by with available metals and plastics, there's room for improvement in raw materials. Example: better elastomeric materials.

Container Challenge: Recent developments in containers have opened new markets for valve manufacture. Most important, perhaps, are the glass aerosol packages—the coated and uncoated units made by Wheaton Glass Co. (Millville, N. J.) and the fibre-encased units designed by Zonite Mfg. Co.

Risdon claims to be selling over 90% of the valves used on the Wheaton bottles (Precision has part of this business, too). For the Zonite container, Calmar Co. (Los Angeles) supplies the valve when the "three-phase" system typical of Zonite Larvex mothproofers is used.

Another fairly unusual valve is De-

Mert & Dougherty, Inc.'s (Chicago) Aerometer Two-Way valve, designed to release the contents whether the aerosol is upright or inverted.

Look Ahead: No valve maker, in this competitive field, can sit back with its current dispenser crop. Although powder products are currently being marketed, there are still problems that restrict wider powder use, and most firms are pushing research.

Other areas of development include design of valves that give uniform spray characteristics over a wide variation of pressures and temperatures, and those that will release a metered quantity of content when the valve button is depressed (one metering valve has been introduced lately).

The hustle demonstrated by valve makers in the past indicates that current problems won't long remain unsolved. The rewards for such developments are tempting, and the competition is such that no firm can slacken its research.



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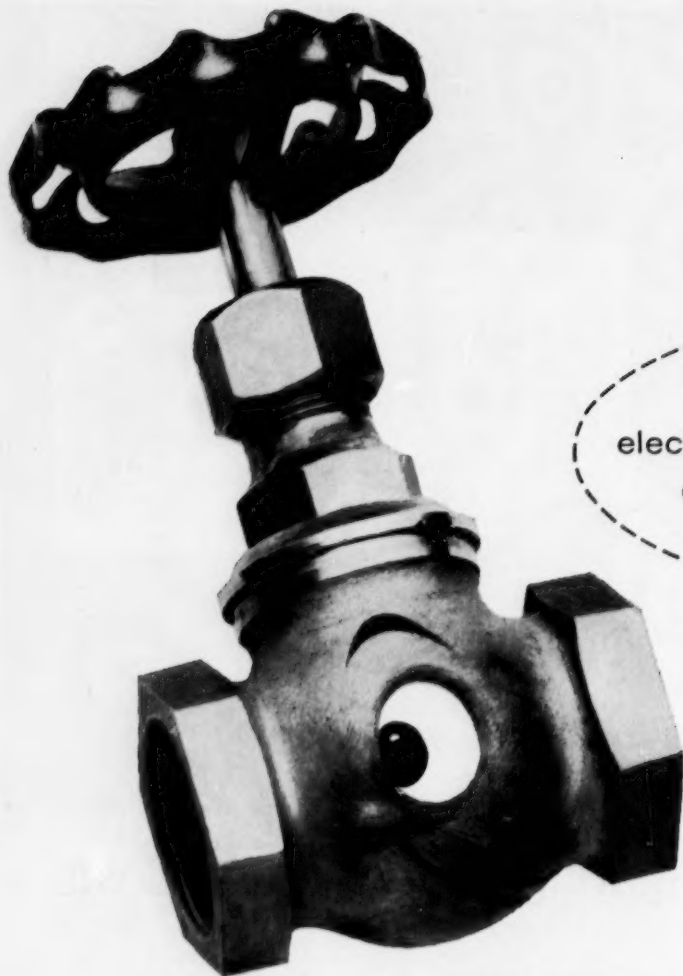


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Vinyl Hide

Nonfilled, applied with conventional equipment, and providing a 10-mil skin with just one coating, a new vinyl protective coat made by Amercoat Corp. (South Gate, Calif.) promises to be one of the more attention-riveting developments in its field.

Slated for introduction next week, the new compound, Amercoat No. 87, is claimed to be the first vinyl compound offering this combination of advantages.

The firm explains the value of No. 87 thus: Thick vinyls—with asbestos or other mineral fillers—have been fairly common, but their applications in chemical plants have been limited because the filler lowers corrosion resistance. The advantages of pure vinyls have been lost because most coatings were too thin—and time and effort required to build up a thick coat put them out of reach of most firms seeking the corrosion resistance of vinyl.

Amercoat says its No. 87 will:

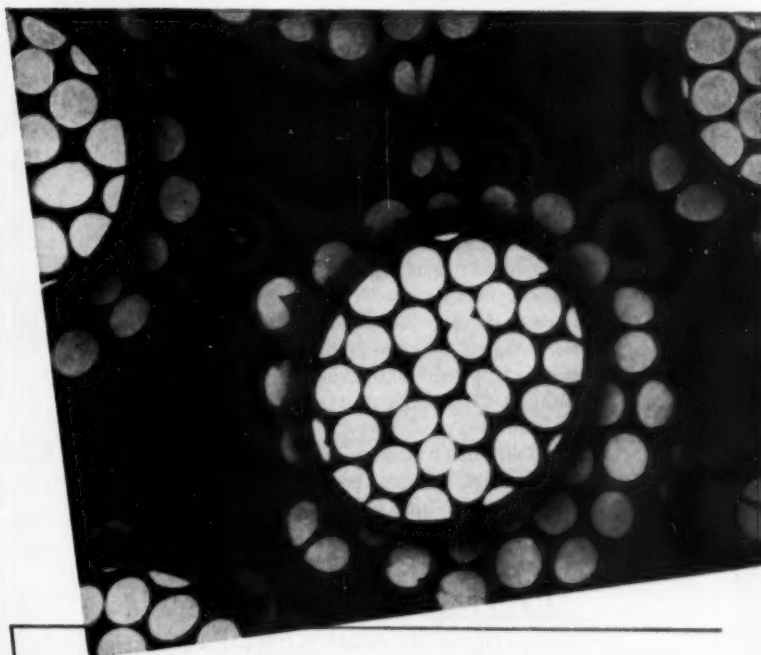
- Build a 10-mil film in one double-pass coating (at normal temperatures).
- Air-dry to a smooth matte finish (by solvent evaporation).
- Cost about 12-14¢ sq. ft. for a 10-mil coat, not including labor. As a comparison, Amercoat matches No. 87 with its previously top vinyl, No. 33: a 5-mil coat of No. 33 can be applied for 7-9¢ material costs, but labor involved in making the film that thick—actually 3 coats—boosts it over No. 87 in total application cost.

Amercoat will sell No. 87 in black, gray, white, and aluminum—coverage is 50 sq. ft./gal. for 10 mils.

Tyro Pesticide

With justifiable pride, Mrs. Oveta Culp Hobby last week took the wraps off the U.S. Public Health Service's new pesticide development, DDVP (CW Newsletter, Feb. 12). Already, Montrose Chemical Co. (Newark, N.J.) is in pilot production of the insecticide, which has demonstrated ability to kill a variety of pests from mites to flies, and appears particularly effective against DDT-resistant insects.

Still being evaluated, DDVP (dimethyl dichlorovinyl phosphate) seems to be about a tenth as toxic as such phosphate insecticides as parathion



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SPECIALTIES

and TEPP. Further, its high volatility lessens residue problems in food crop applications. The USPHS sees possible use as a dairy barn insecticide, as well as a crop insecticide.

Light Fraction: It was because of its high volatility that DDVP was discovered. George Pearce, at the Savannah, Ga., labs of the USPHS, noted that the Farben insecticide L 13/59 (Dipterex) was most deadly to flies when it was first used. Reasoning that this might be due to a volatile fraction, he probed further, came up with an impurity that he believed to be dimethyldichloroacetyl phosphonate (DDAP). With the help of Arnold Mattson and Janet Spillane at Savannah, he prepared larger samples of the product by treating O,O-dimethyl 2,2,2-trichloro-1-hydroxyethylphosphonate with alkali.

Agriculture Dept. chemists at Beltsville, Md., led by Stanley Hall, were notified of Pearce's work, began preparing analogues of DDAP. In their work, the Beltsville team discovered that Pearce had erred somewhat on the formula: in addition to the dehydrochlorination, a rearrangement from an acetophosphonate to a phosphate also took place at the same time to give O,O-dimethyl 2,2-dichlorovinyl phosphate.

Complement to DDT: Until toxicologists and entomologists complete their work, Montrose will keep DDVP on a pilot-plant basis. Montrose, as a major producer of DDT, figures the new bug killer will not supplant DDT, but will rather complement it. It sees DDVP more as a competitor with parathion and the other phosphates. Cost of the product is still relatively high, but Montrose says quantity production can bring it into line price-wise.

Specific Sequesterer: Hart Products Corp. (New York) has a new sequestering agent, Kalex G, specific for heavy metal ions such as ferric iron, nickel, cobalt, zinc.

Controllable Foam: Just introduced by Bakelite Co., a division of Union Carbide and Carbon, is "syntactic" foam, a cellular plastic recommended for use as a low-density filler in sandwich constructions, castings and low-density aggregates. The product is made by bonding microscopic phenolic spheres (Microballoons) together

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 basis.

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P 5433 Chemical Week

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SPECIALTIES

with polyester, phenolic or epoxy resins, Bakelite says. It's claimed to differ from conventional foams in that it can be controlled throughout the production operation.

Armature Aerosol: An industrial aerosol, Monarch Red Synthetic Insulator, is now sold by Monarch Electric Co. (La Salle, Ill.) for spraying on either new or old armature windings to give protection from oil, water, acid, alkali.

Stick Repellent: Exit Labs (Minneapolis) has introduced a stick-type mosquito repellent called Git Coin. Two sizes are available: ¾ oz., 59¢; 2.4 oz., 89¢. Composition is 7% 2-phenylcyclohexanol, 7% 2-cyclohexylcyclohexanol, 90% inactive.

Two for Furniture: Munising Wood Products Co., Inc. (Chicago) has two



War Is Heck

IT'S MIGHTY UNPLEASANT, but it's better than the Communists. That's the apparent reaction of a young Chinese boy to a DDT spray. The insecticidal dose (from an American sprayer) was given to all the refugees aboard the Chinese Nationalist troopship that carried out the evacuation from the Tachen Islands to Keelung, Formosa. The civilian personnel, mostly dependents of soldiers stationed there, were removed to Formosa in the early weeks of February.

new aerosols for furniture: one, a seal and stain for unfinished wood, for re-finishing; the other a spray lacquer that gives a protective finish to wood, metal, linoleum, rubber, leather. Both items come in 12-oz. sizes, sell for \$1.98.

Temporary Protection: A temporary protective coating for use on stainless steel, aluminum, copper and decorative laminate surfaces has been brought out by Spraylat Corp. (New York). The product, Spraylat SC-1503, is a waterbase compound, costs under 1/2¢/sq. ft. It's said to be non-toxic, present no fire hazard.

Tough Epoxy: Rezolin, Inc. (Los Angeles) is marketing an epoxy resin said to provide exceptional impact strength. Name: L-940 Flexible

Epoxy. It's recommended for drop hammer punches, draw dies, pressure pads, clamping cushions. The formulation permits control of the degree of flexibility. Rezolin reports.

Tube Hike: Total collapsible tube manufacture and sales set new records in '54 in the cosmetic, dentifrice, household and industrial fields—although total shipments dipped slightly compared with 1953 (1953 output, 962,226,320; 1954, 959,902,704). Over half of U. S. tube production went into toothpastes, where there was a gain of about 2% (to 475,676,352). In shave creams and pharmaceuticals, there were slight drops.

Paint Line: Certain-teed Products Corp. (Ardmore, Pa.) will introduce a new line of interior finishes next

month—including are both alkyd and latex paints.

One Score Each

The Arkansas supreme court last week knocked out that state's "fair-trade" law (around since 1937), in a court scuffle involving National Carbon's Prestone antifreeze. The company had been seeking to prevent a distributor from selling Prestone for \$2.97/gal. rather than its suggested minimum of \$3.75/gal. But the court ruled that to force a firm to abide by a price when it had not signed a price agreement was depriving the retailer of a "valuable property right" without due process of law.

About the time of the Arkansas ruling, on the other hand, Delaware's "fair-trade" act backed up Du Pont's efforts to hold the price line on its Zerex and Zerone antifreezes.

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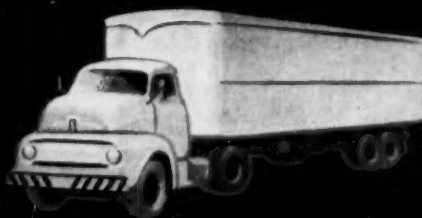
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